THE
RAILWAY GAZETTE

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EAST AFRICAN RAILWAYS

The illustration shows two of the new 'Class 90' Diesel-Electric locomotives now in service with the East African Railways.

These locomotives, built by The English Electric Co. Ltd., in conjunction with their associates, Robert Stephenson and Hawthorns, have the 1 Co-Co 1 wheel arrangement, well suited to the local conditions. The gauge is 1 metre, convertible to 3 ft. 6 in.

All axles run in Timken bearings, mounted in axleboxes and cannon-boxes also supplied by the bearing manufacturer.

British Timken, Duston, Northampton, Division of The Timken Roller Bearing Company. Timken bearings manufactured in England, Australia, Brazil, Canada, France and U.S.A.

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tapered roller bearings

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Innumerable users order Osborn castings exclusively and have come to rely on the consistent standard of high quality made possible by experience and the latest methods of production and design.

85 cwt. steel casting supplied to The English Electric Company Ltd. for a turbine exhaust chamber.

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NIFE Steel Alkaline batteries will withstand plain hard service and temporary neglect. They are highly resistant to severe shock or vibration or even sudden accidents, and are therefore specially suitable for rugged service. The heaviest currents, even down to short circuit, will not damage them.

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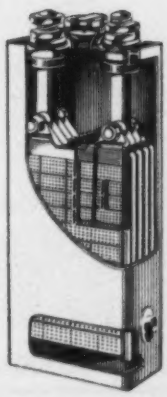

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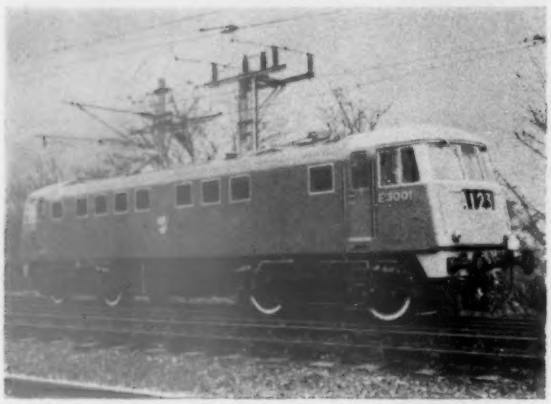
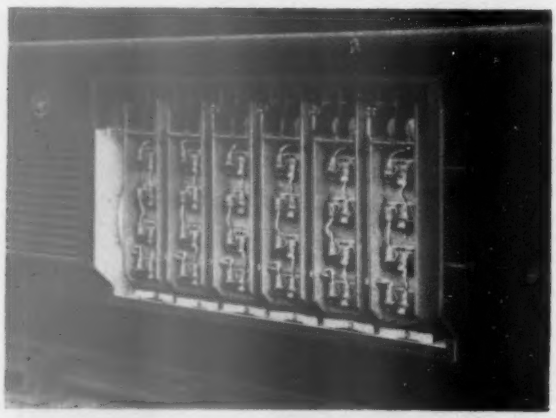
A new push-button type control desk at Broxbourne on the Bethnal Green–Bishops Stortford line of the Eastern Region.



WESTINGHOUSE

BRAKES

Type 'A' 3,300 h.p. electric locomotive, one of 23 by A.E.I. Ltd., for London Midland Region, fitted with Westinghouse Electro-Pneumatic Brakes.



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Netherlands Railways Photograph

AEI Traction Motors, Gears and Resistors etc. are used on these "Plan F" equipments for the Netherlands Railways.

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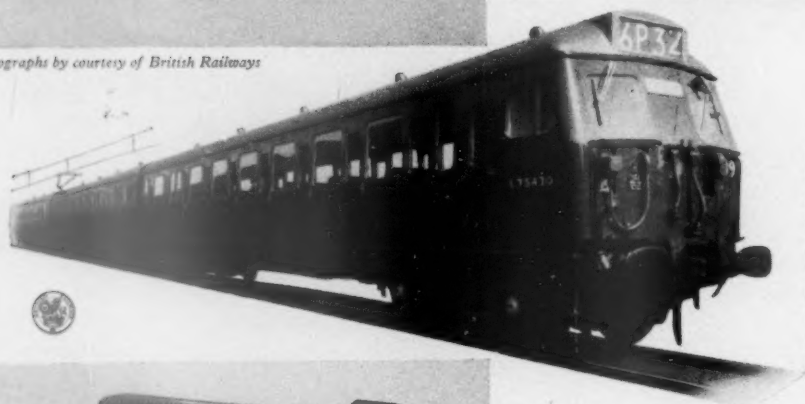
Photographs by courtesy of British Railways



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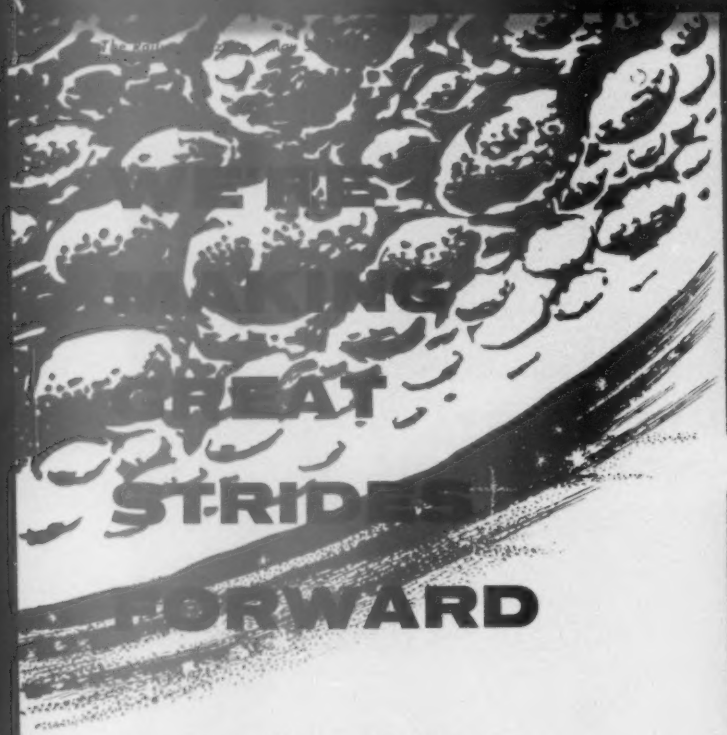

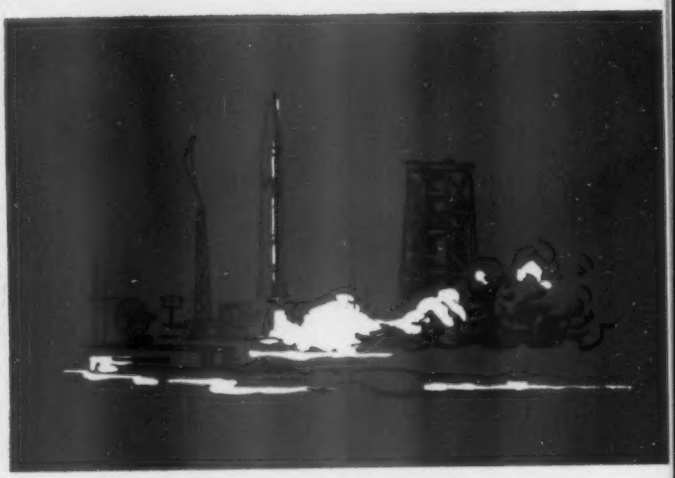

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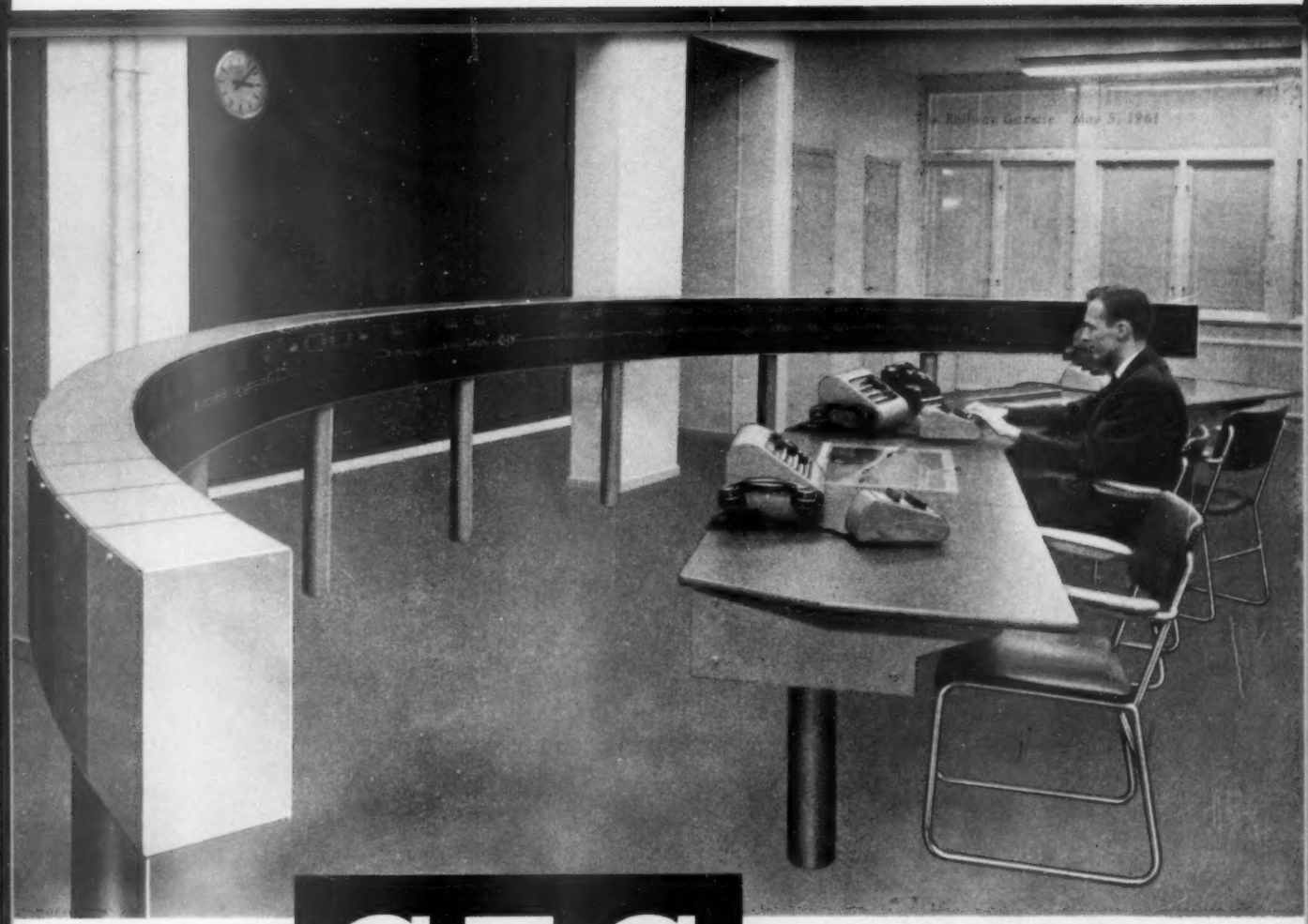

Largest C.T.C. plant in Europe

On January 30 this year the Swedish State Railways opened the first section of the C.T.C. plant on the Ljusdal—Långsele line. The C.T.C. office is situated at Ånge and, when the plant is completed, will control 41 stations extending over a distance of 170 miles. This will be the largest C.T.C. plant in Europe.

The C.T.C. equipment was supplied by L M Ericsson.

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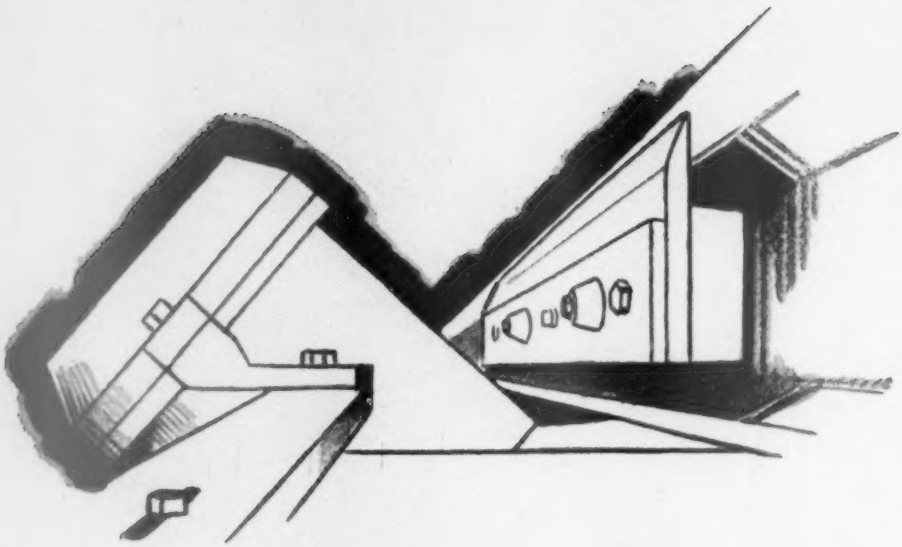

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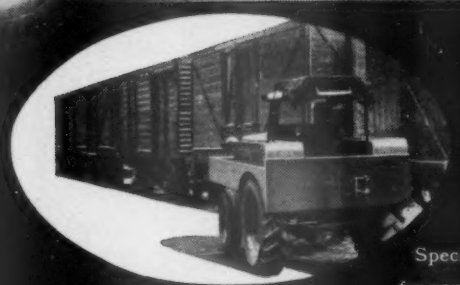

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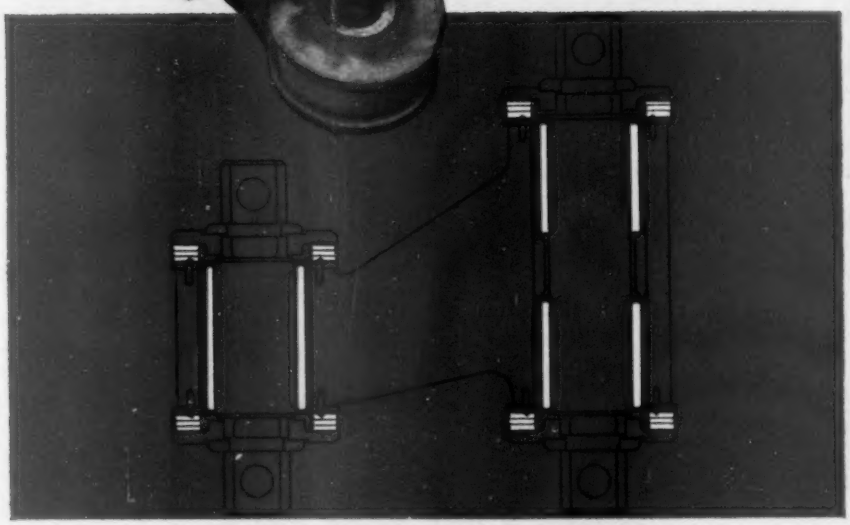

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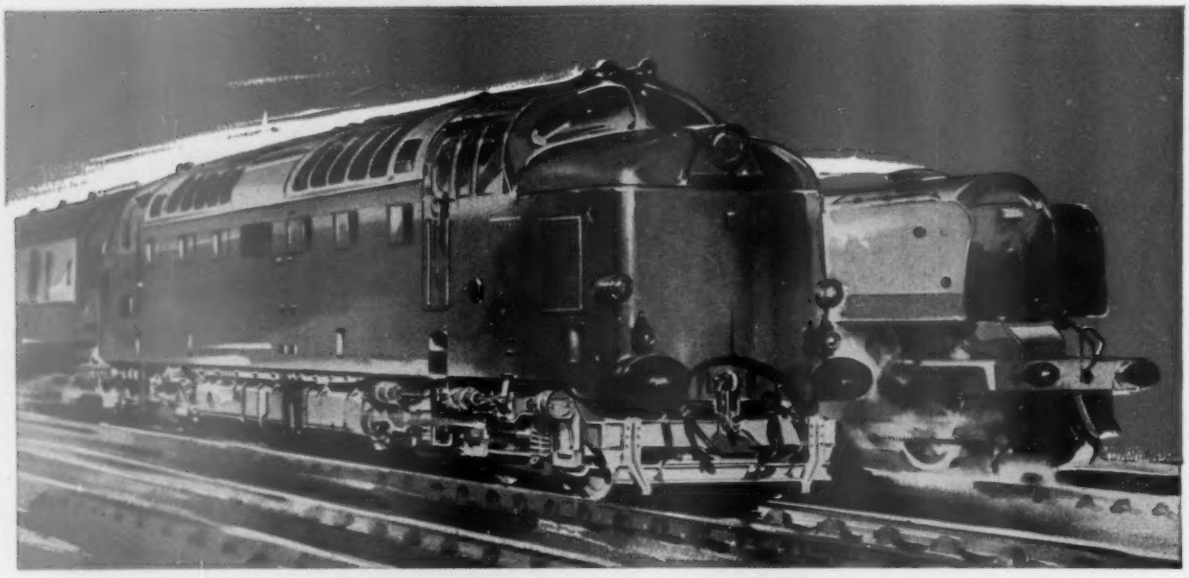

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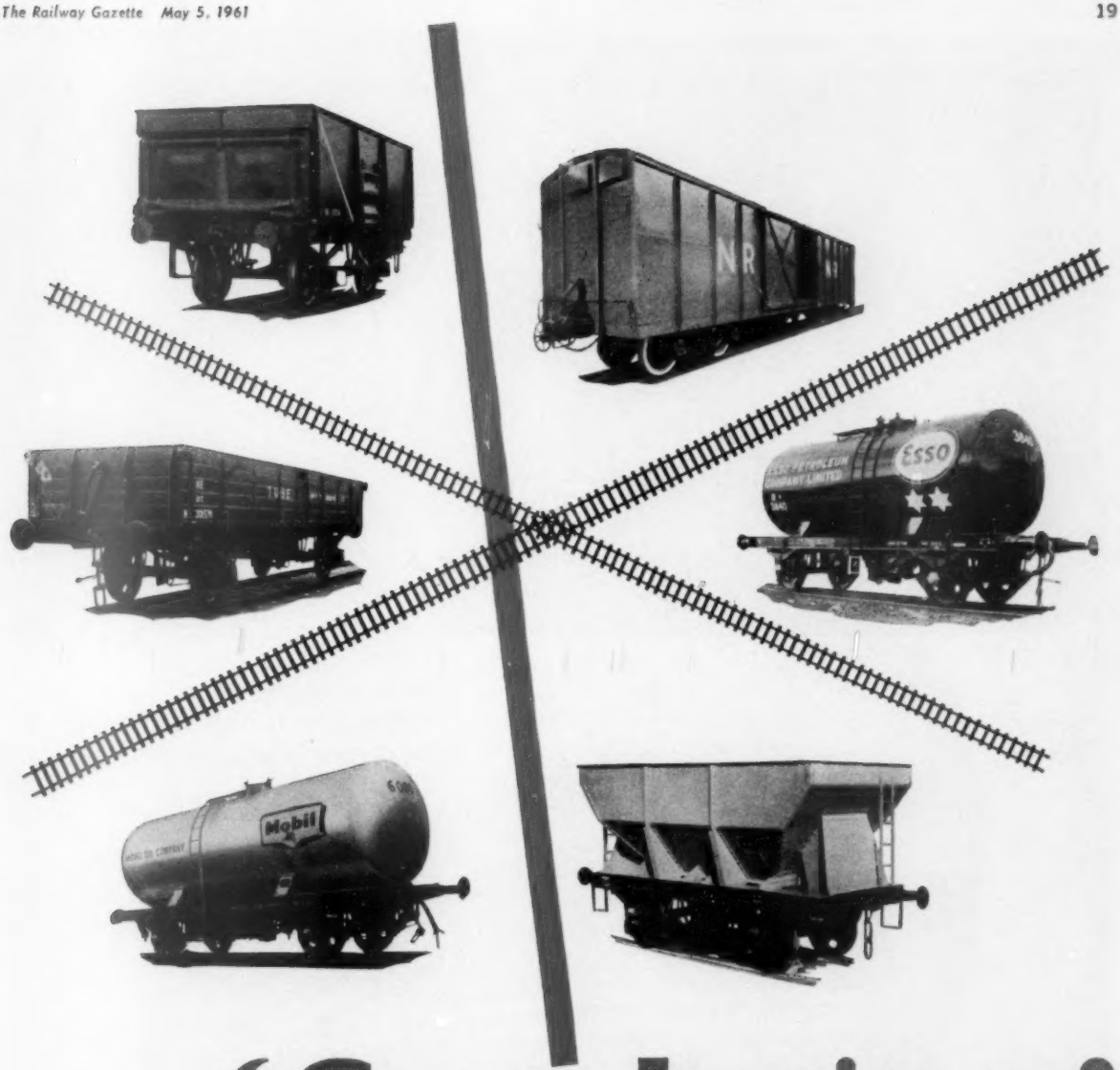

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diesel locomotives with hydraulic power transmission for main, branch and industrial lines, for every gauge, axle load and output up to 4000 h.p.

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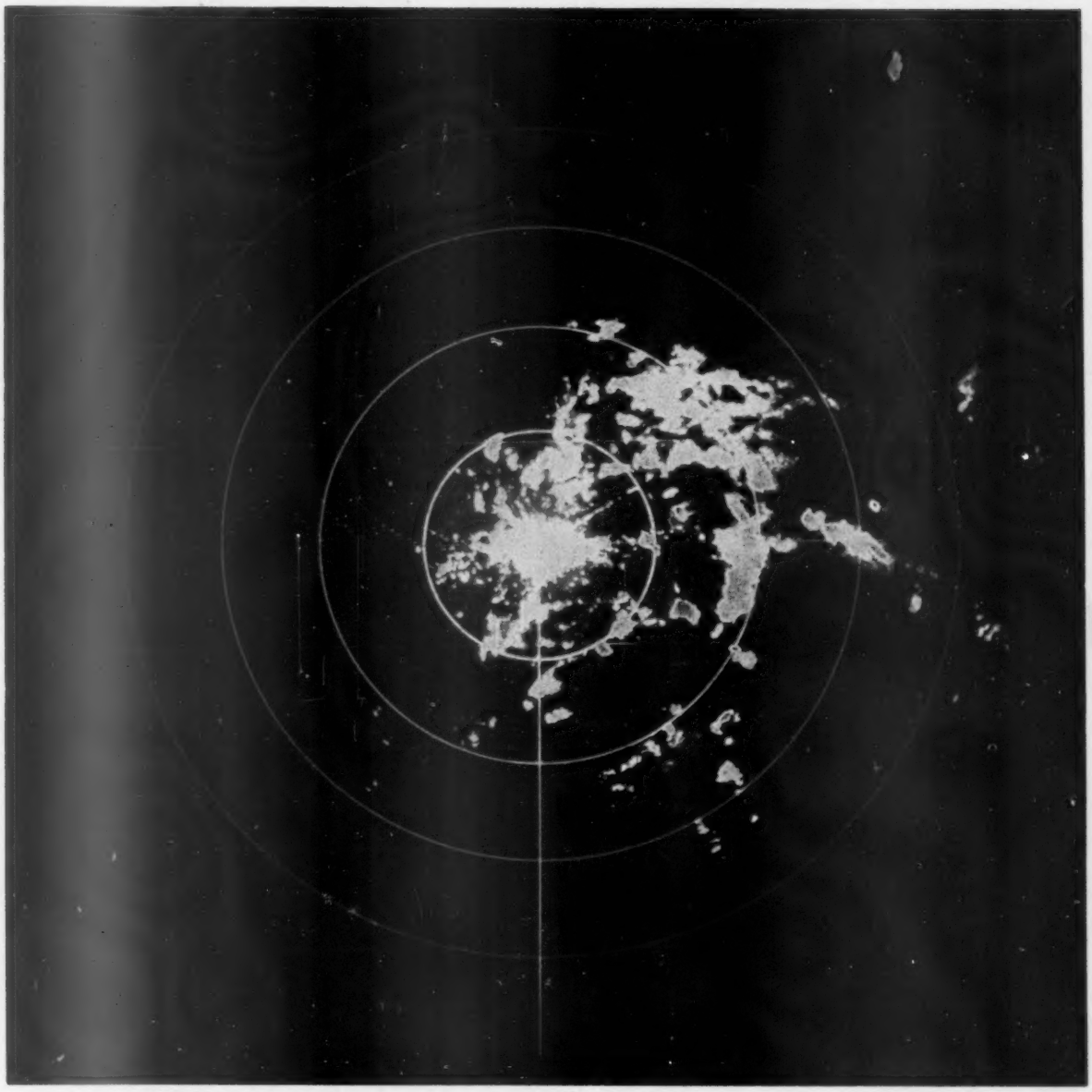

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with 3 ft. 0 in. Squaring Table having Power Feeds and Rapid Traverse

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SPECIFICATION:

Facing head diameter	24 in.
Six facing head speeds ...	choice of 3 ranges
Two facing slide speeds (1 forward 1 reverse) ...	choice of 4 ranges
Facing slide length of feed	9 in.
Table size	3 ft. 0 in. square
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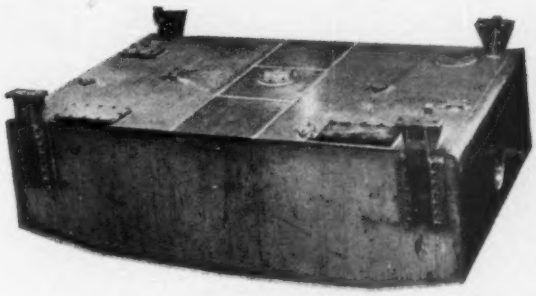

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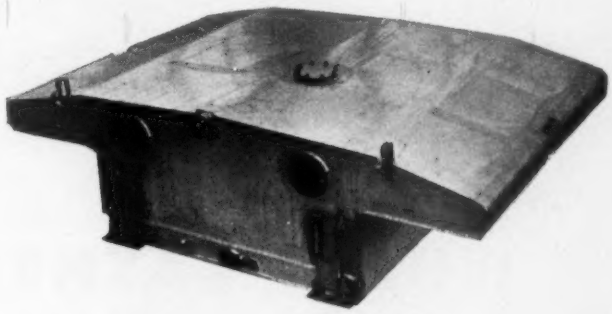

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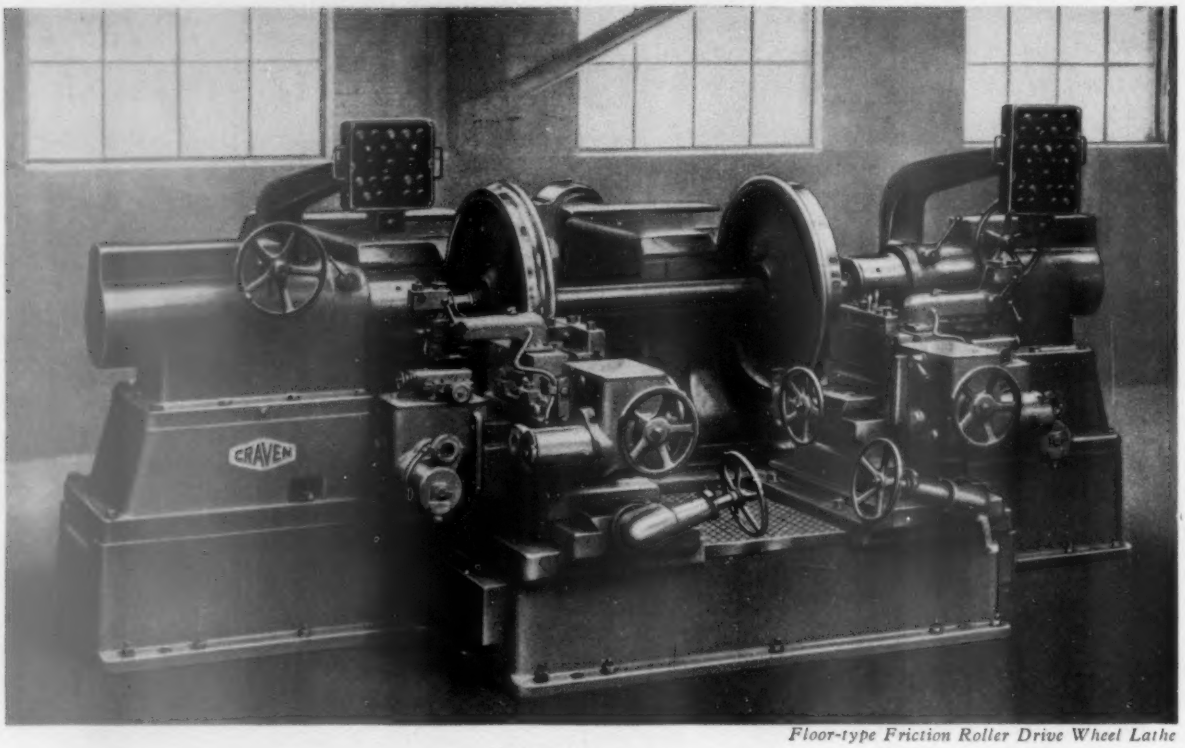

Floor-type Friction Roller Drive Wheel Lathe

FLOOR-TYPE AND PIT-TYPE

WHEEL LATHES

WITH FRICTION ROLLER DRIVE AND ELECTRICAL PROFILING

Recent developments in Craven Railway Wheel Lathes utilise carbide tools for re-turning diesel and electric traction wheels. The floor-type lathe deals with dismantled wheel sets, either with or without their axleboxes in position: the pit-type lathe re-turns wheel sets in position on the vehicle. The drive is by two pairs of hydraulically-loaded friction rollers—one pair to each wheel—giving a balanced, self-contained thrust upon the wheel rims to transmit a high driving torque without risk of distortion. Tread and flange form profiling is by Craven patent fully-automatic, single-point electrical profile copying equipment.

Patent Nos. 849291 & 833326, and application No. 29749/59.

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PRECISION LATHES
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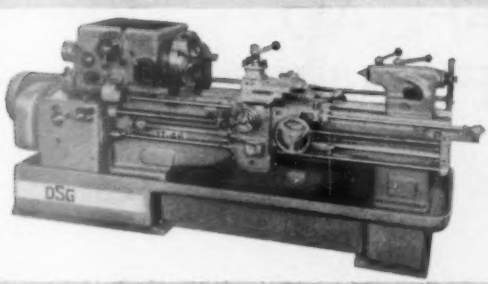

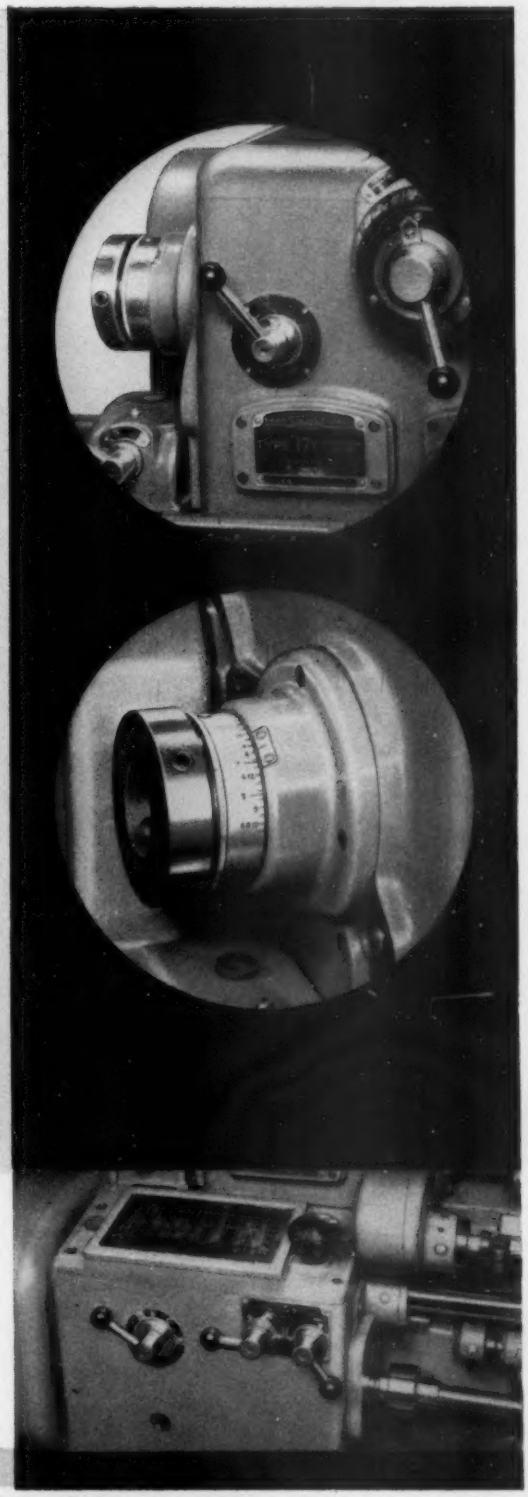

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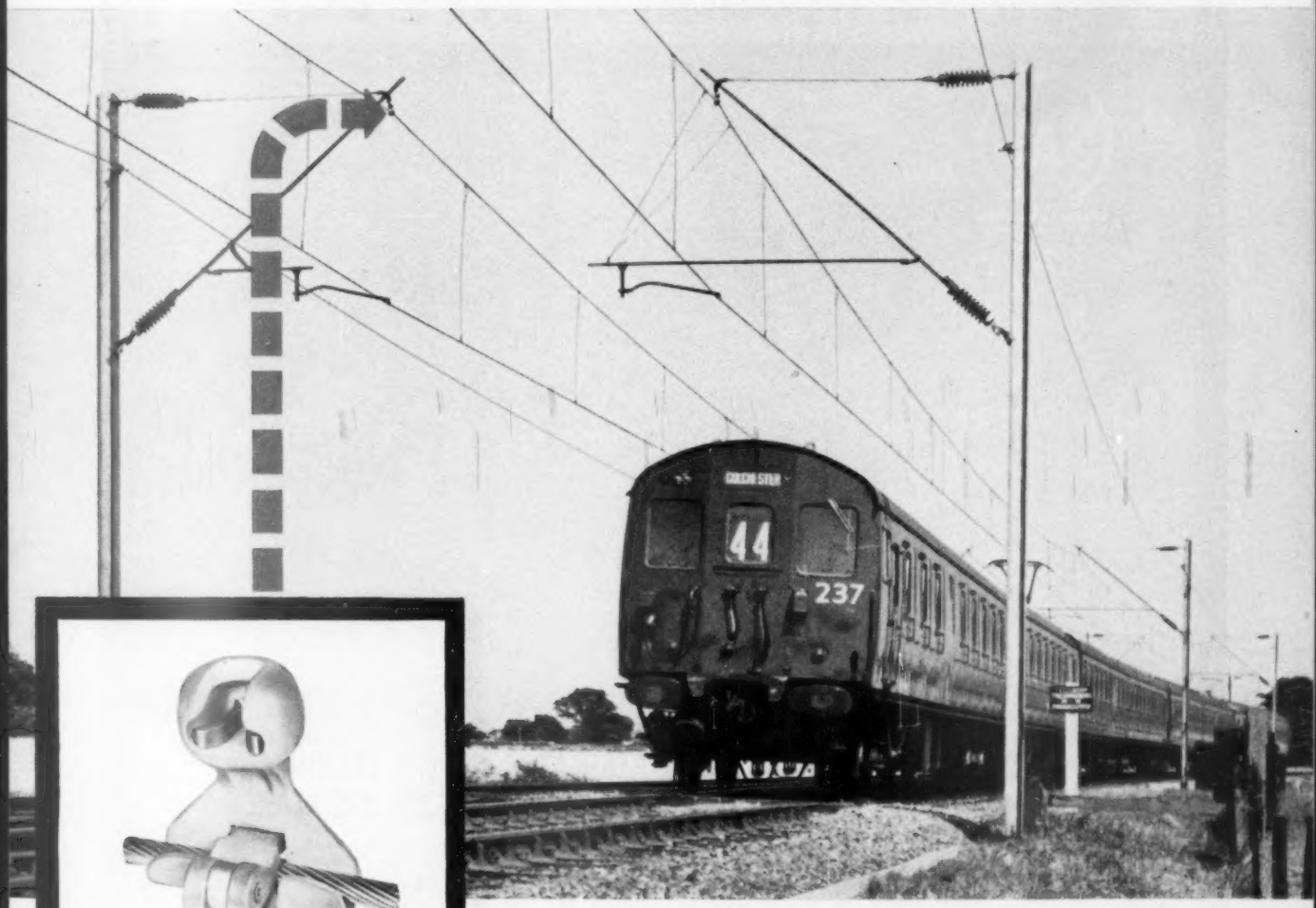
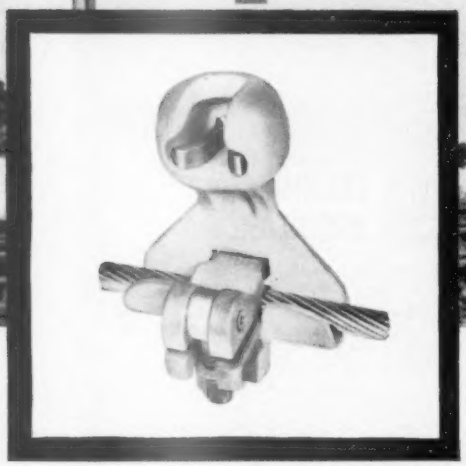
For half a century the BICC Group have been designing and erecting overhead electric traction equipment to suit all systems in every continent. Much of this equipment, including fittings, is manufactured within the Group; the conductors come from our own copper refinery and wire mill.





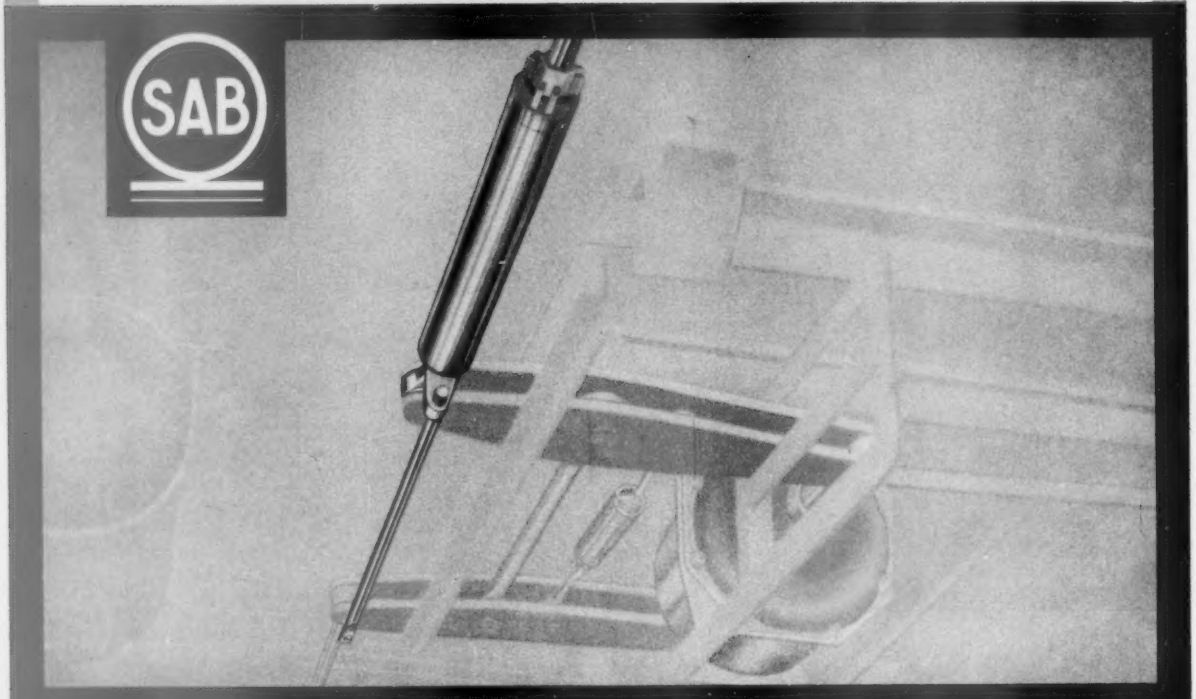
British Railways Modernization — 25kV A.C. simple catenary overhead equipment on the Colchester-Clacton-Walton section of the Eastern Region
Inset:
The BICC suspension clamp — a single bolt secures the catenary wire

railway electrification by the BICC GROUP

other services include the supply and installation of FEEDER CABLES · SIGNALLING CABLES · OVERHEAD LINES
TELECOMMUNICATION CABLES · FLOODLIGHTING TOWERS
CALLENDER-HAMILTON BRIDGES

BRITISH INSULATED CALLENDER'S CONSTRUCTION CO. LTD. 30 LEICESTER SQUARE LONDON WC2

SAB DOUBLE-ACTING RAPID-WORKING BRAKE REGULATOR TYPE DRV



IN MORE THAN 50 COUNTRIES

Although the productions of the SAB Company cover a wide range of empty/loaded braking devices, the product most closely associated by railway engineers with the symbol SAB is the double-acting, rapid-working SAB Brake Regulator.

SAB Brake Regulators have been delivered to leading Railways in more than 50 countries all over the world. In most of these countries, SAB Brake Regulators have been adopted as a standard component of the brake equipment. They have gained a reputation for efficiency and reliability, resulting in an ever increasing number of installations on all types of railway vehicles.

BRAKE REGULATOR TYPE DRV

The most advanced member of the SAB slack adjuster family is the fully automatic, double-acting, rapid-working Brake Regulator Type DRV, the result of more than 40 years of specialised experience of automatic slack adjustment.

The DRV regulator is built into the brake rigging as part of a pull rod. It rapidly takes up or pays out slack, thus maintaining correct brake block clearances. In addition it contributes to easier replacement of worn brake blocks, no manual adjustment being required after the operation. The DRV Brake Regulator also makes it possible to use a simple mechanical empty/loaded braking device.

TECHNICAL ASSISTANCE

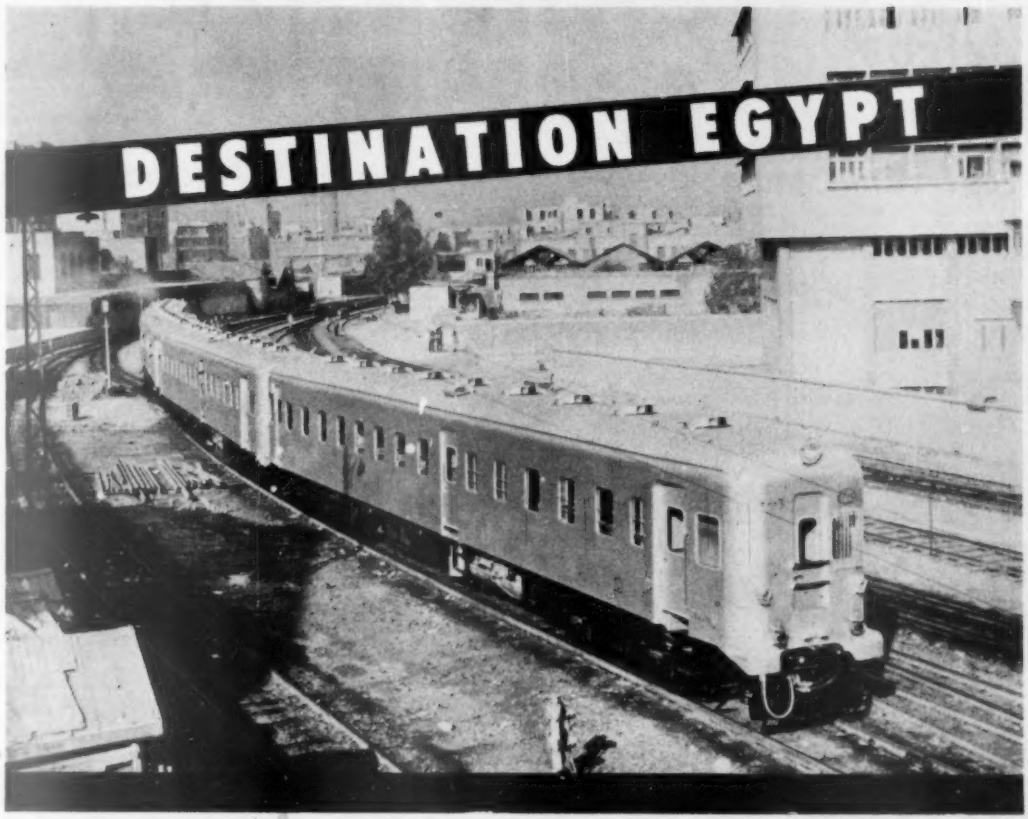
Whenever brake slack adjustment and empty/loaded braking problems require an effective solution, it is advantageous to consult SAB.

The SAB Company has built up an important service organisation which, with its expert knowledge, is ready to deal with any problem relating to brake rigging and brake installation for all types of railway vehicles.

The SAB Service Engineering Department checks proposed brake rigging designs and provides detailed installation drawings as a service to customers. It also assists whenever necessary at the actual mounting on the vehicle.

BROMSREGULATOR MALMÖ — SWEDEN

HITACHI



1. Gauge of track .....
   4 ft. 8½ in. (1,435 mm.)
2. Seating capacity —
   2nd class..... 24 seats
   3rd class..... 100 seats
3. Tare weight .....approx. 45 tons
4. Leading dimensions.....
   Length (between coupling faces) 25,525 mm.
   Overall width ..... 2,760 mm.
   Overall height (above rail level) 4,430 mm.

The first 20 units of 350 Diesel-powered cars for the Egyptian Railway, U.A.R., were completed in January 1960 at Hitachi's Kasado Works. Up to October 1960, 90 cars have been delivered in total and these cars are now in their service operation with complete satisfaction of the customer.

The 350 cars are composite units, with provision for one 2nd class and two 3rd class compartments with driving cabs at each end. They can be operated independently or in a train of up to four cars as required.

Special consideration was paid to the weather and operating conditions that these cars will meet when in service. Dustproofing, improved springing, simplified maintenance as well as general passenger comfort and convenience have been stressed with particular emphasis on body and bogie frame strength. This latter point has been assured by the use of welded pressed steel sheet construction.

Hitachi, Ltd.

Tokyo Japan

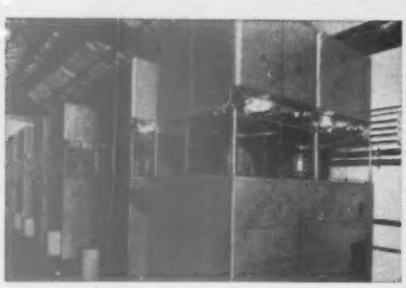
Cable Address: "HITACHY" TOKYO

IN TRACTION SERVICE IN 18 COUNTRIES ... Hewittic RECTIFIERS

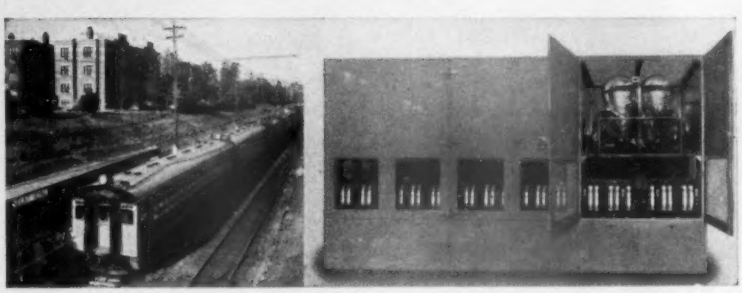
the converting plant used by the World's principal railways

One of 28 substations equipped with Hewittic Rectifiers by the British Transport Commission for the Southern Region of British Railways. The photograph shows Wimbledon substation with one wall cut away to show the two 2,500 kW rectifiers in this half of the building.

A train passing one of the 14 Hewittic Rectifier substations on the Liverpool-Southport line. These have an aggregate capacity of 24,260 kW and supply 93 miles of electrified track. Hewittic Rectifiers installed on other sections of this region total 47,300 kW.



The 4,000 kW Bond Street substation, equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and enclosed air-cooled transformer units. This company is also responsible for the supply and installation of all A.C. and D.C. control gear. Some 90,000 kW of Hewittic Rectifiers have been supplied to the London Transport Executive.



The electrified section of the Canadian National Railways, comprising some 70 track miles in the vicinity of Montreal Terminal, is supplied with D.C. by Hewittic Rectifiers in two 3,000 kW substations at Central Station and Saraguay. The photographs show left, a train leaving Mount Royal Station, and right, one of the four 1,500 kW equipments in service. These are designed for operation at 3,000 volts, D.C.

Send for Publication R200/3

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More and more builders of new Diesel Railcars choose GRESHAM'S QUICK RELEASE VACUUM BRAKE SYSTEM

Photo by courtesy of the Birmingham Railway Carriage & Wagon Co. Ltd., and British Railways.

PATENT NO. 790657

Fully Automatic in event of breakaway. Inexhaustible brake reserve. The safest brake in the world.

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Standard vacuum braked vehicles can be hauled by railcars with the brakes fully effective throughout.

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of this fully graduating brake system with many novel features now supplied or on order.

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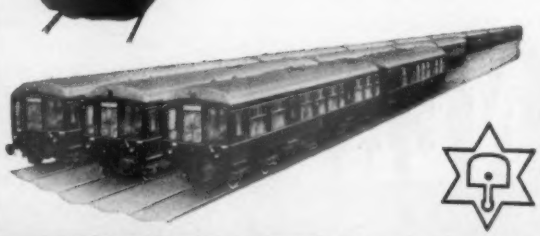
Photo by courtesy of Metropolitan-Cammell Carriage & Wagon Co. Ltd. and British Railways.

Photo by courtesy of A.E.C. and G.N.R.B.

Photo by courtesy of British Railways Derby Works.



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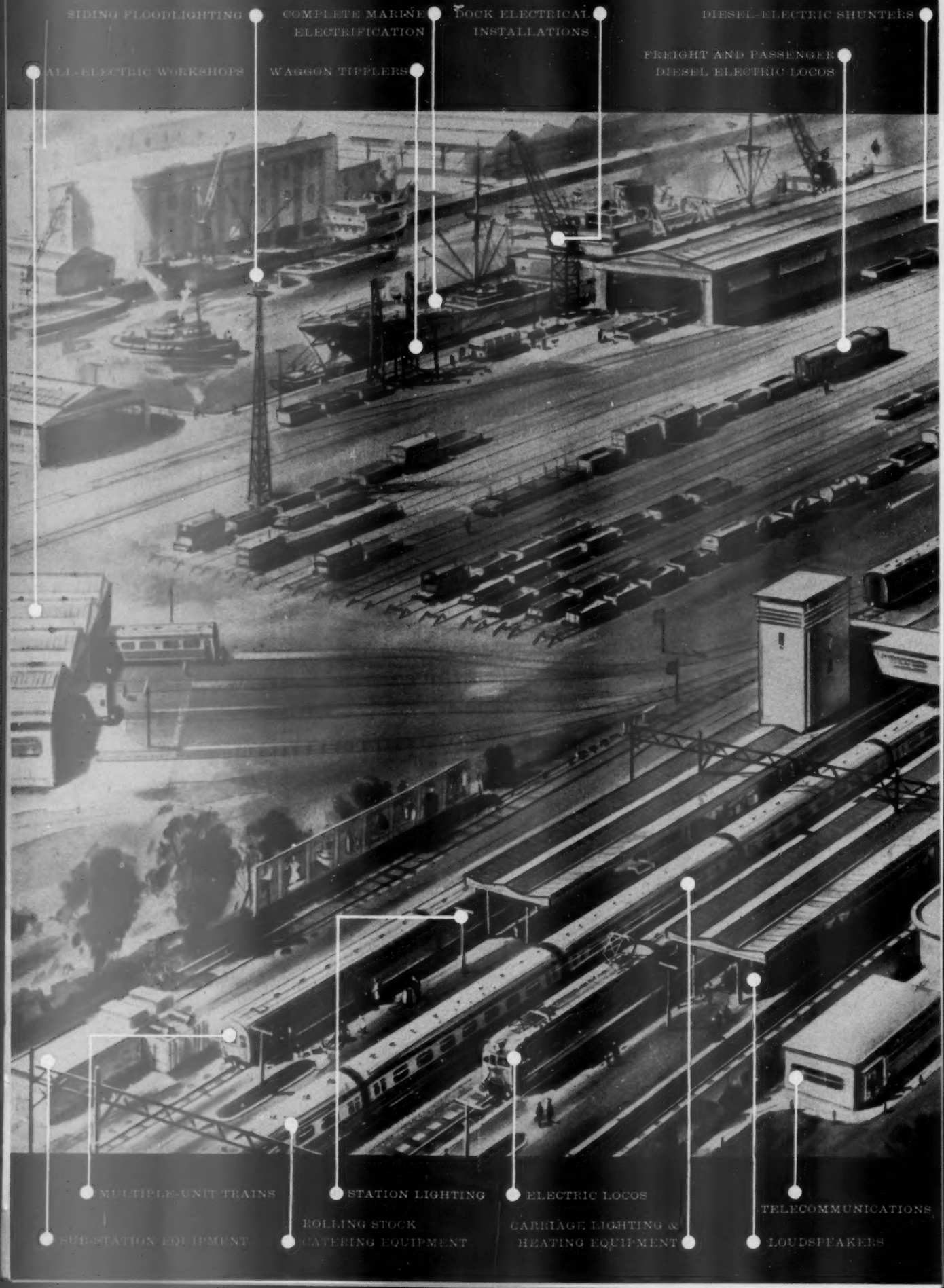
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COMPLETE MARINE ELECTRIFICATION
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CARRIAGE LIGHTING & HEATING EQUIPMENT
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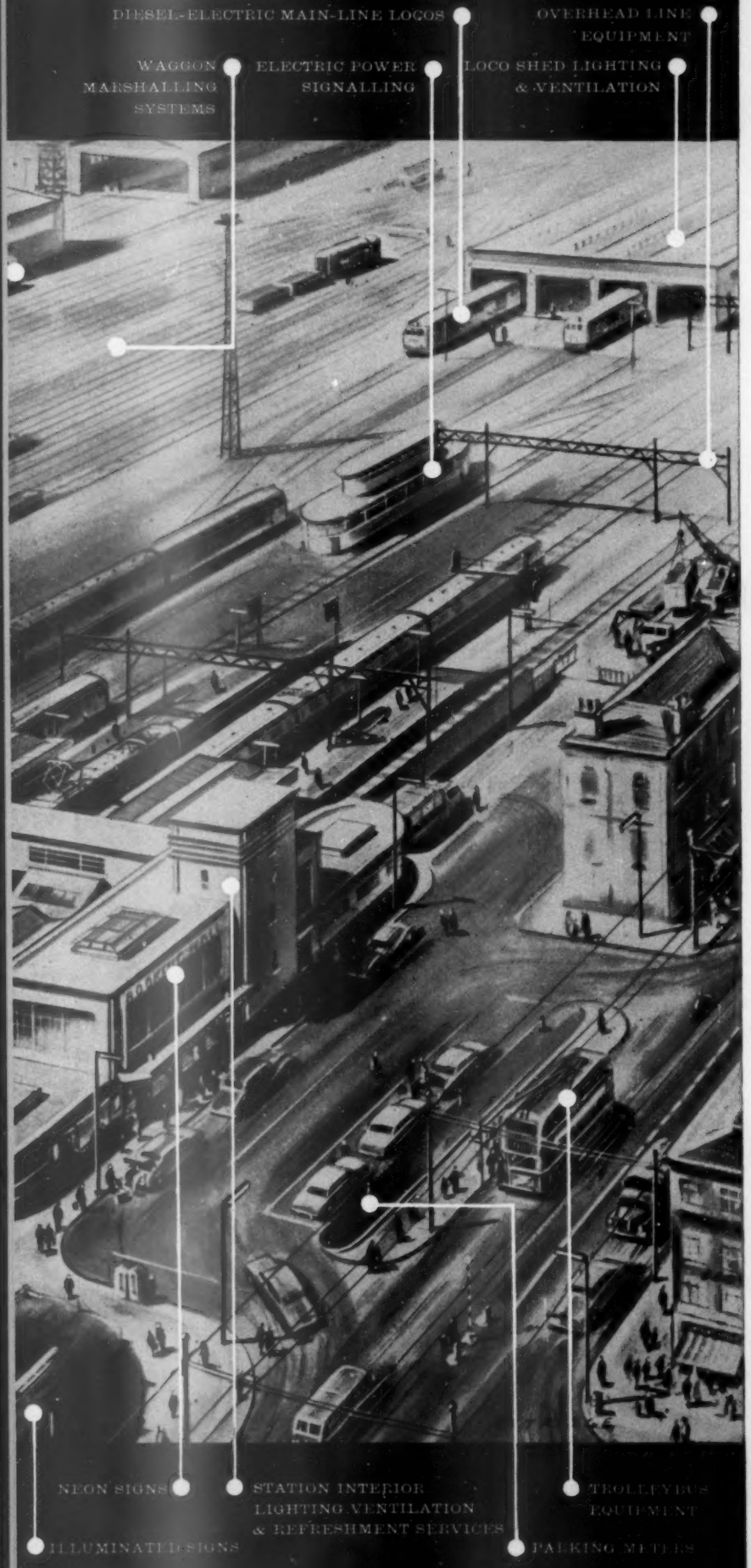

the picture tells the story

G.E.C. designs, manufactures and installs equipment for the complete electrification of railway systems.

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THE GENERAL ELECTRIC CO LTD OF ENGLAND
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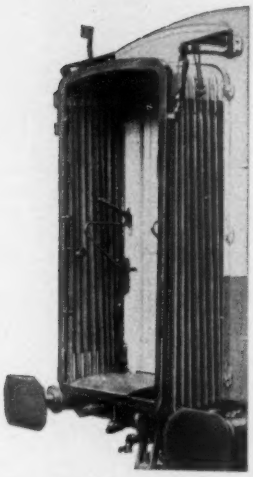

GANGWAYS?

WILDS concentrate on Gangways! Despite continual large-scale production for the British Railways diesel programme, further enquiries can be accommodated. The Gangway Service covers design to delivery.

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AW.125

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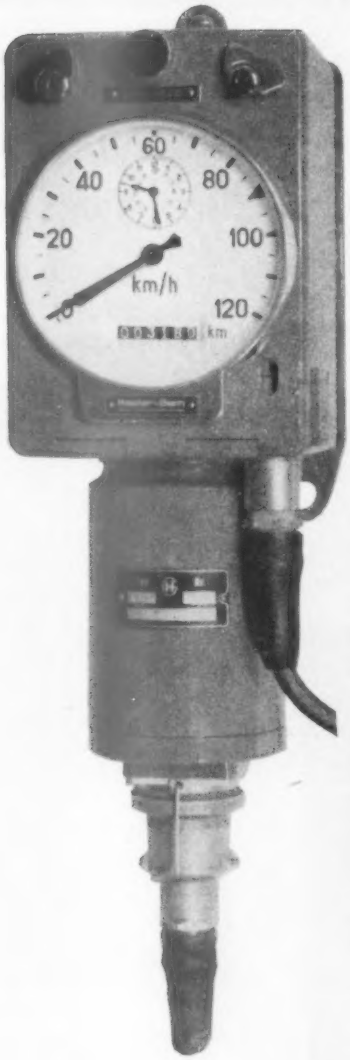

Illustration shows two Alco/Goodwin "44 Class" Diesel-Electric Locomotives fitted with TELOC A16/RT.9 Speed Indicating and Recording Equipment.
(Photograph reproduced by kind permission of the New South Wales Government Railways.)

TEL/TELOC Speed Indicating and Recording Equipment is operating on the following Railway Systems:

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Excellent dimensional stability
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Good chemical resistance
Low coefficient of friction
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For: Centre pivot liners · Rubbing pads · Swing link bushes Bogie bolster side bearers · Drawgear bushes · King-pin wear sleeves · Horn cheek and axle box liners · Brake gear bushes Buffer guides · Corridor end facings etc.

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STC and Railway modernisation...

BRITISH RAILWAYS are installing STC all-transistor telecommunications equipment as part of their MODERNISATION PLAN

STC SCT-12

For the London Midland Region: all-transistor 12-circuit 2-wire carrier-on-cable telephone system in service between Manchester and Carlisle, Lancaster and Barrow, Preston and Blackburn, Manchester and Liverpool.
For the Western Region: between Paddington and Reading.

STC TF-3

For the Western Region: all-transistor 24-channel frequency-shift modulated, voice frequency telegraph system in service between Paddington and Reading.

STC STO-C

For the Western Region: all-transistor 3-circuit open-wire carrier telephone system in service between Reading and Bristol, Bristol and Cardiff.

STC LD-1A

For the Western Region: 300-circuit small-diameter coaxial cable system with all-transistor subterranean repeaters to be installed between Cardiff and Swansea.

STC COMMUNICATIONS GROUP

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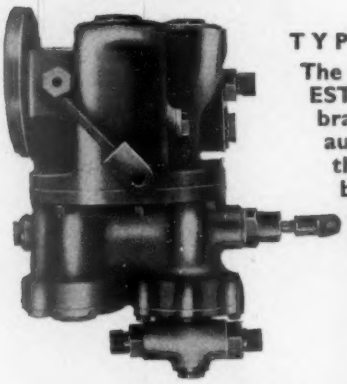
AIR BRAKE EQUIPMENT for

Carriages and Wagons

OERLIKON PATENT DESIGN

TYPE EST3d.

This standard and basic design of Triple Valve enables the controlled application and release of brakes on goods and passenger trains. It is suitable for all sizes of brake cylinder and is in accordance with the conditions laid down for the admission of goods and passenger trains for international traffic. Leaflet A.9.

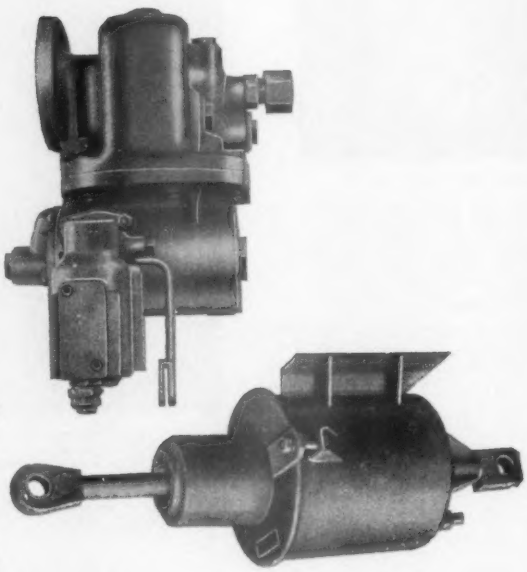


TYPE EST4d/AL.

The AL device used in conjunction with the EST Triple Valve, as illustrated, enables the brake cylinder pressure to be regulated automatically in proportion to the load on the vehicle, thus enabling the maximum brake efficiency to be obtained under all conditions. Among the advantages associated with this equipment are the simplicity of installation, further, the brake cylinder filling and releasing times are unaffected by load changes. Leaflet A.8

TYPE EST4d/R
TRIPLE VALVE

In this instance the type R device has been added to the EST Triple Valve to enable two-stage braking to be obtained. This arrangement when applied to high speed passenger coaches and controlled by the vehicle speed enables the maximum brake efficiency to be obtained and greatly reduces the distance required for stopping a train. This style may also be used for simple load and empty braking with the two stages Hand controlled. Leaflet A.5.



TYPE SB BRAKE CYLINDER
(Made under licence from STABEG)

A simple lightweight design of Brake Cylinder embodying a patent piston seal giving automatic lubrication to the cylinder walls and exceptionally long life to the seal. A further patent covers a security device which simplifies maintenance and examination of the Cylinder which is made in all standard sizes and styles. Leaflet A. 14.

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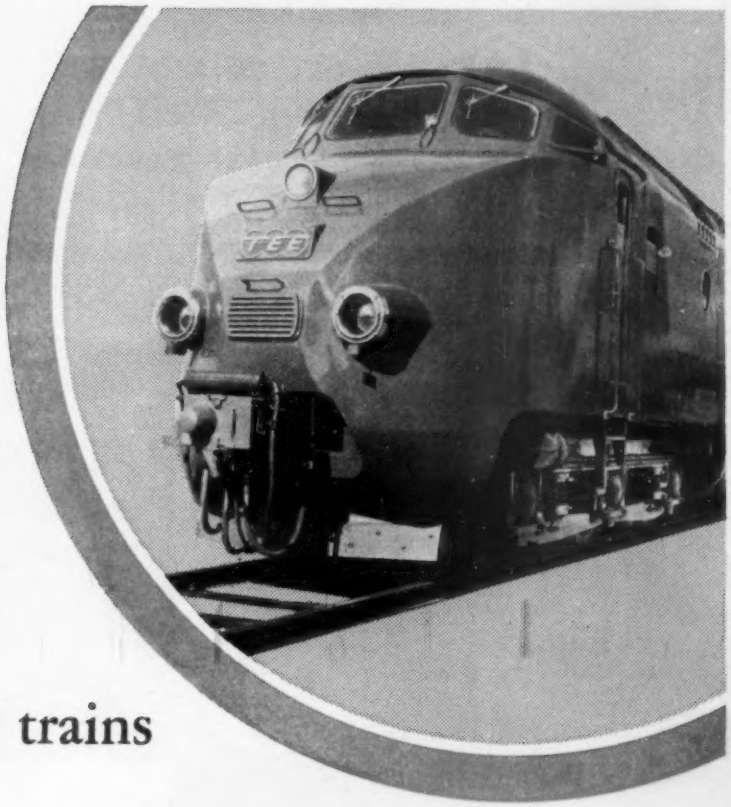
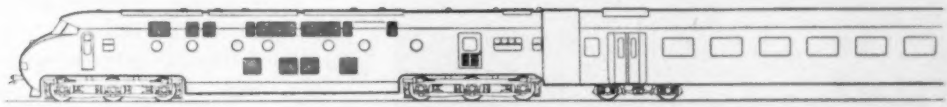
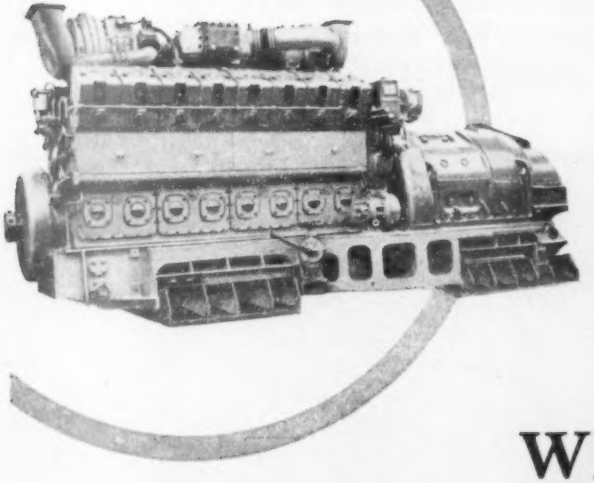


WERKSPOOR

power cars for the famous TEE trains





Trans Europ Express trains,
which came into service in June 1957,
quickly gained world-wide fame.
These trains were built by Werkspoor,
in co-operation with Swiss Industrial Company of Neuhausen,
and Brown, Boveri & Co. Ltd of Baden, Switzerland.
The power cars were designed and
manufactured by Werkspoor.
They are driven by Werkspoor RUHB
high speed diesel engines,
successfully tested to U.I.C. standards.
Werkspoor RUHB type engines are famous
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There are in service many Werkspoor locomotives,
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which have run for well
over 400,000 miles
without overhaul.

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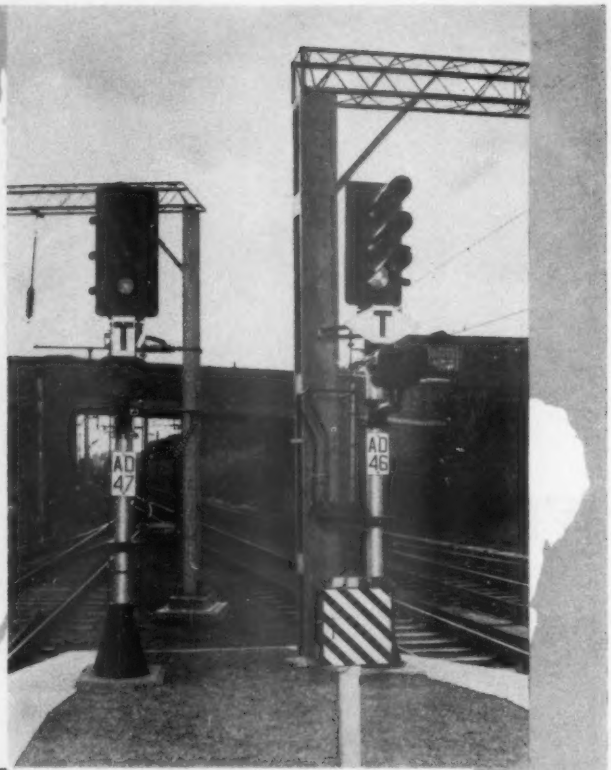
WORKS AT AMSTERDAM AND UTRECHT

RE-SIGNALLING FOR SCOTTISH REGION

Airdrie to Kelvinhaugh Section of North Clyde Electrification project

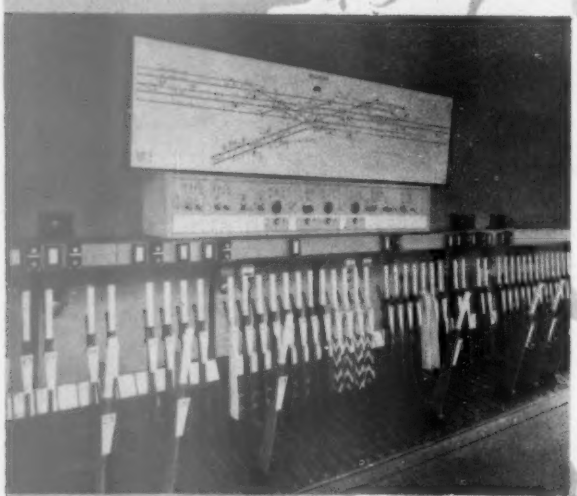
Introduction of colour light signalling
Elimination of 11 mechanical boxes
Two new electro-mechanical boxes
10 boxes re-equipped



Starter and shunt signals at Airdrie Station.

The Airdrie to Kelvinhaugh Re-Signalling Scheme has proved extremely successful since it was officially opened on November 5th, 1960. This signalling contract for S.G.E. involved 16 miles of double track, including the Springburn and Bridgeton Cross Branches. 350 track circuits, 50 motor operated points and 120 colour light signals were installed.

The system is controlled by switch panels in 10 rehabilitated mechanical boxes and 2 new electro-mechanical boxes, dispensing with 11 mechanical signal boxes.



Hybrid control of signals and points at Bellgrove signal box.

SGE SIGNALS

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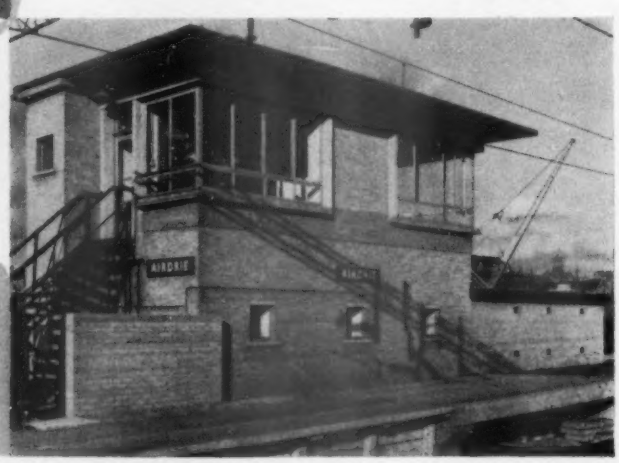
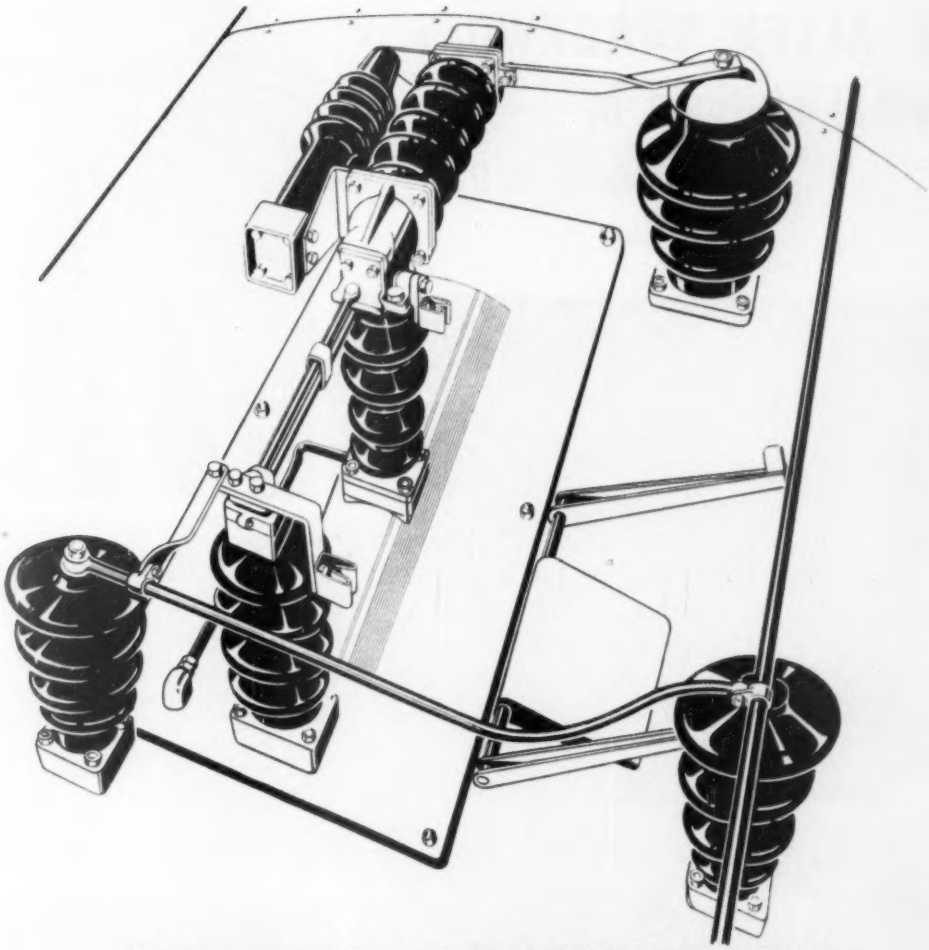


Airdrie signal box.



MAIN-LINE ELECTRIFICATION

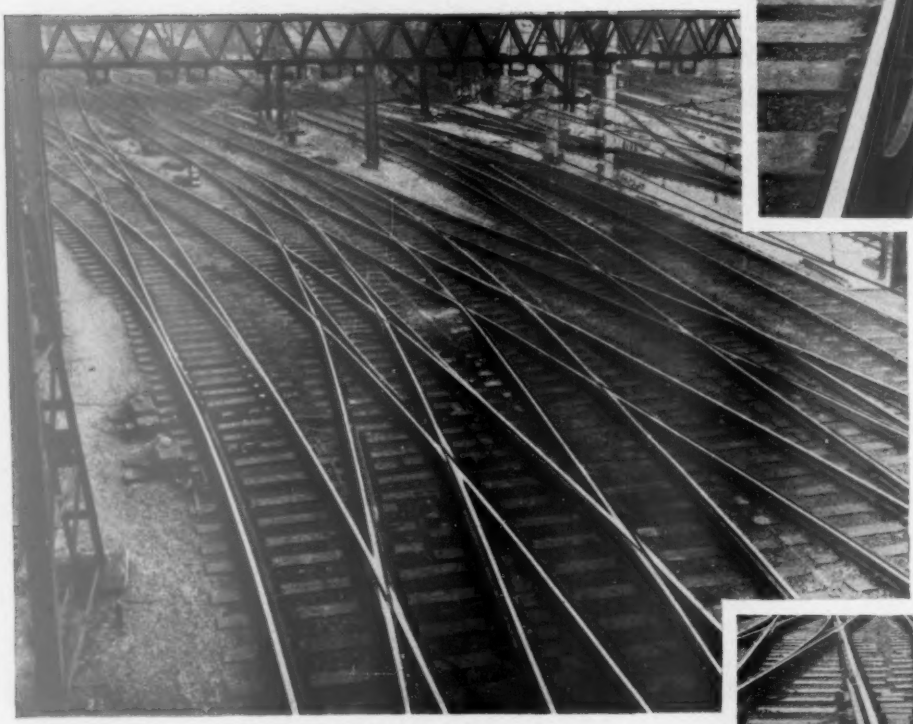
This Reyrolle 25-kV single-phase air-blast circuit-breaker has been designed specifically to control the incoming supply to electric locomotives

400 amperes current rating.
250-MVA breaking capacity at 25 kV.
Compact and robust construction.
Simple six-bolt fixing to roof of cab.
Immediate access to all major working-parts to facilitate maintenance.
Operation from locomotive's compressed-air system.

Reyrolle

Hebburn - County Durham - England

EDGAR ALLEN TRACKWORK at terminal stations in electrified areas



Cast manganese steel crossings at Liverpool Street Station.
Photographs by courtesy of British Railways, Eastern Region.

Obtuse cast manganese crossing

Common cast manganese crossing

With the introduction, by British Railways, of diesel and electric trains, greater wear takes place on the switches, crossings and closure rails. Manganese steel has been used at many of the leading terminal stations and has been found to stand up to the wear better than other steels. At Liverpool Street Station over 120 cast manganese steel crossings have been put in, together with rolled manganese steel switches and closure rails, in the running lines on both eastern and western sides of the station.

Edgar Allen & Co. Limited have also installed layouts in manganese steel in other terminal stations in London and Glasgow.

To find out more details of Imperial Manganese Steel Trackwork, why not fill in the request form.

EDGAR ALLEN & CO. LIMITED
IMPERIAL STEEL WORKS, SHEFFIELD 9

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POSITION .....
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A journal of Management, Engineering and Operation

VOL 114 FRIDAY MAY 5 1961 No. 18

CONTENTS

	PAGE
Editorial notes	493
Modernisation conference	495
Swiss Federal Railways	495
London Midland summer services	496
West of India Portuguese Guaranteed	496
U.S.A. railways begin 1961 badly	497
Letters to the Editor	498
The scrap heap	499
Overseas railway affairs	500
Publications received	500
West Riding grill and bar	501
Tamar suspension bridge	502
Railway modernisation conference	503
Electric traction section	509
Personal	515
New equipment and processes	517
News articles	519
Contracts and tenders	521
Notes and news	522
Railway stock market and official notices	524

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Disintegrating the B.T.C.

ONE of the most retrogressive proposals in the Government's White Paper on the reorganisation of the nationalised transport undertakings relates to the future of the road passenger transport companies at present owned, either in whole or in part, by the British Transport Commission. For over 30 years since the railway companies first made their investments in a number of bus undertakings, the return on the capital so employed has been highly satisfactory. Even more important, from an overall transport viewpoint, the close co-operation which has been achieved by having railway representatives on the boards of these companies has had a markedly beneficial effect on both railway and road passenger operation. The railway participation in the bus companies, which number among them some of the largest in the country, has been a very practical means of co-ordinating services by rail and road to the benefit of all parties, including the travelling public. Under the proposals in the White Paper, the Commission's shareholdings are to be transferred to a new holding company which will be responsible to the Minister, who will appoint its board. Under it will be grouped British Road Services, the Tilling (Buses) Group, the Scottish Omnibuses Group, British Transport Hotels, Road Freight Shipping Services, and Thomas Cook & Son Limited. There is no indication at this stage as to whether it will be thought desirable to have representatives of the railways on any of these boards, but there is no suggestion that there will be in the White Paper itself. If, in fact, as would seem reasonable from the phraseology of the White Paper, there is to be a complete severance of the railway connection, both the railways and the bus companies will be the losers, and so also, before very long, will the travelling public. This is not the only example of putting back the clock which seems to be inherent in many of the provisions of the White Paper, but it would certainly appear to be one which could, and should, be avoided. The selling-off of part of the British Road Services' fleet did great harm to the Commission in its efforts to deal rationally with overall transport. The divorce of the bus companies would be a step towards creating chaos in another sector of the industry.

Changing pattern of Britain's trade

SPEAKING at the annual dinner of the Southampton Chamber of Commerce on April 28, Mr. Reginald Maudling, President of the Board of Trade, said that Britain must be prepared to react quickly to changing trade conditions, face up to new difficulties, and seize new opportunities with vigour. Growing industrialisation meant that the emphasis in developing countries was shifting from consumer goods to capital equipment. Many countries were determined to pursue home production—this was reasonable, and Britain should participate in this activity. The proceeds of exporting "know-how" and components could in many cases equal, or even exceed, previous exports of finished articles. There were rich opportunities in highly-industrialised markets for specialised products. It was important to be flexible and to meet the changing demands of customers. The new pattern of trade constituted a challenge which, if met with a competitive spirit at home and abroad, would offer great new opportunities which would more than counterbalance the difficulties involved.

Increased activity in home engineering

THE Board of Trade has announced that the flow of new orders to British industries producing engineering and electrical goods, locomotives, and railway track equipment, railway carriages and wagons, heavy commercial vehicles, and wheeled tractors, which increased in January, continued to rise in February. As in the previous month, the whole of the increase was in orders from the home market. With net new orders exceeding deliveries substantially, the volume of orders on hand in these engineering and allied industries increased by 3 per cent, while for the home market alone the increase was 4 per cent. It is provisionally estimated that the volume of production in the engineering and electrical goods industries in February was 5 per cent more than in February last year. Taking January and February together to lessen the effect of

erratic movements, production in the first two months of 1961 was 3 per cent more than a year earlier. Export deliveries increased the Board of Trade's index (average 1958 equals 100) rising from 105 to a provisional figure of 122.

F.B.I. reports on Spanish market

LAST February, the Federation of British Industries sent a delegation to Spain to study Spanish economy in the light of the recent Stabilisation Plan; to examine the possibilities for increasing Anglo-Spanish trade and the ways in which the United Kingdom could help in Spain's development programme, and to obtain details of Spanish foreign investment legislation. In a report just published entitled " Spain: a challenge and an opportunity," Sir William McFadzean, who led the delegation, states that there are good prospects of supplying plant, equipment, and machine tools in the Spanish market, and for entering into mutually-beneficial partnerships. More British industrialists should visit Spain, not only to see for themselves the potentialities of the market, but because the Spaniards place particular importance on personal contacts.Copies of the report, which deals among other things with the Spanish railways, are obtainable from F.B.I. Print & Publications, 21, Tothill Street, London, S.W.1, price 7s. 6d. post free (excluding airmail).

$22-million loan for Thai Railway

THE World Bank has approved a loan equivalent to $22 million to the State Railway of Thailand to assist in a six-year modernisation programme. Under this, the railway will purchase about 65 main-line and shunting diesel locomotives and some 1,650 freight wagons, will replace about 360 miles of track with heavier rail, re-model station yards and construct or extend sidings, replace about 350 wooden bridges with steel or concrete, install signalling and telecommunications equipment at 100 stations, and purchase machinery and equipment for repair shops. The loan will finance the diesel locomotives and freight wagons and most of the steel for the bridge construction. The total cost of the modernisation programme is estimated at more than £12 million, of which the State Railway of Thailand will finance 60 per cent from its own resources ; the balance will be covered by the loan. Procurement of all imported goods and equipment will be on the basis of international competitive bidding.

Reasons for Trans-Pennine diesel's success

AN ARTICLE in the current issue of the *Leyland Journal*—the magazine of the Leyland group—throws some unofficial light on the reasons why railway passenger traffic between Liverpool Lime Street and Manchester Exchange has jumped by as much as 125 per cent, and why it is up by between 50 and 100 per cent between Manchester, Leeds, and Hull. Interviewing passengers, the author of the article decided that the bus-type frequency of the combined services is a big attraction. One regular commuter claimed that the Trans-Pennine had " added a new dimension " to rail travel—whenever possible, he sat in a front seat so that he could share the driver's view. His wife, on her way to an exhibition in Manchester where she also planned to do some shopping, could have shopped in Liverpool and, but for the speed, comfort, and cleanliness of the diesel, would have given the exhibition a miss. The Griddle was praised for its convenience and one man said it was not worth travelling by car.

Thirteenth electrical power convention

THE British Electrical Development Association will hold its thirteenth convention at Eastbourne from June 12 to June 15. The theme of the convention will be " Electricity in the prosperity and welfare of the nation," and the President will be Sir John Pickles, Chairman of the South of Scotland Electricity Board. On June 13 and 14, papers will be read by Sir Christopher Hinton, Chairman, Central Electricity Generating Board ; Mr. R. R. B. Brown, Chairman, Southern Electricity Board ; Dr. A. E. Grauer, Chairman, British Columbia Electric Co. Ltd., Vancouver, Canada, and Mr. S. F. Steward, Director, British Electrical & Allied Manufacturers' Association. The annual dinner will be held on the evening of June 14, when the principal guest will be Mr. John S. Maclay, Secretary of State for Scotland. On Thursday, there will be an electrical forum comprising Sir John Pickles (Questionmaster) ; Mr. F. H. S. Brown, Deputy Chairman, Central Electricity Generating Board ; Mr. Sebastian Z. de Ferranti, Managing Director, Ferranti Limited ; Mr. A. A. Fulton, General Manager, North of Scotland Hydro-Electric Board, and Sir Robertson King, Chairman, Electricity Council (panel).

Vigorous action on the C.N.R.

SPEAKING informally in London on April 27, Mr. A. H. Hart, Vice-President (Sales) of the Canadian National Railways, outlined the changes his system is undertaking to keep abreast of transport developments. On the freight side, increased regional and area powers plus quick channels of communication allow local offices to give individual quotations—one special case referred recently to Montreal was settled within half an hour of its asking. On the passenger side, despite severe competition from road and rail, the company believes the future has much to offer, particularly in transcontinental travel. Believing that the speed and comfort of modern trains allow the Canadian scene to be appreciated in a way impossible from the air or from a motor-car, the C.N.R. intends to win its share of the surplus of money deriving from rising standards of living. Price reductions for each fare after the first for parties of any number, and all-in tickets covering fare, meals, and tips, are bringing encouraging results in this direction.

Social problems of transport development

DURING May 8-19, the Inland Transport Committee of the International Labour Organisation will meet in Geneva for its seventh session. It will study the social problems resulting from the development of railways and road transport. Reports will cover the general conditions of work of railwaymen ; the social consequences of changing methods and techniques in railways and road transport ; the action taken in various countries in the light of the conclusions adopted by the Committee at previous sessions, and recent events and developments in inland transport. Factors which have helped to change general conditions of railway work and consequently its standing and security will be examined. Particular consideration will be paid to the effects of the replacement of steam traction by diesel or electric traction. Conclusions adopted will be communicated to the governing body of the I.L.O. and will contribute to the development of action taken by governments and national employers' and workers' organisations.

Maintenance planning and control on C.I.E.

A RECENT step in the reorganisation of Coras Iompair Eireann has been the establishment of a planning and control unit in the maintenance division of the Mechanical Engineer's Department. Its function is two-fold. The planning section determines when examinations should be carried out on rail vehicles and specifies what work should be undertaken at such examinations. The control section ensures that vehicles are made available as scheduled. Personnel of both sections are well versed in the practical aspects of their work. Repair specifications are subjected to work study analysis and usage rates are forecast for spare parts. The control section is in touch round the clock with its counterpart at Amiens Street Station by

special telephone link. Six maintenance inspectors travel on footplates and report any defects so that immediate action can be taken at the nearest depot. Results to date have been encouraging. Failures and delays have been reduced, and standards raised.

Engineering works in Uganda

LAST month the important 46-mile realignment between Bukonte and Jinja on the East African Railways & Harbours was completed. This is the latest stage in the continuing process of adapting the railway system in Uganda to meet present needs and to ensure its full competitiveness with other forms of transport. The new railway has a curvature limited to 4 degrees and a ruling gradient of 1 per cent. It is 45 miles shorter than the existing route and some 2½ hr. will be saved by trains between Central and Eastern Uganda, which will enable earlier delivery times at Jinja and Kampala. This will be of particular importance to perishable traffic, such as milk and meat. The shortening of the journey time is estimated to result in overall operating economies of some £140,000 a year. Five bridges—two of major importance—have been built, and a total of 140 culverts has been installed. The track is either 75 lb. or 80 lb. rails on steel sleepers. The cut-off has been built in 21 months at a cost of approximately £1,500,000.

E.C.M.T. annual report

THE European Conference of Ministers of Transport, which consists of the ministers from the O.E.E.C. countries and Yugoslavia, has recently published its 7th annual report. After the recession of 1958 and 1959 freight traffic carried by rail in the E.C.M.T. countries increased towards the end of 1959 and recovery gathered momentum in 1960. The average volume of transport expansion in 1960 was similar in the six E.E.C. countries and the seven E.F.T.A. countries (9 to 10 per cent) and also in Yugoslavia. Owing, however, to the shrinkage in the volume of transport in the other member countries the aggregate increase was only 7·7 per cent for the E.C.M.T. countries combined. The decline in passenger transport (about 1 per cent in 1958 and 1959) continued in 1960, but more slowly.

Cheaper tunnel construction

PRESENTING a paper to the Institution of Civil Engineers on May 2, Mr. A. K. Terris, Chief Civil Engineer, Eastern Region, British Railways, and Mr. H. D. Morgan, Consulting Engineer, described a new principle adopted in the design of tunnels on the Eastern Region's main line near Potters Bar. The principle, which has solved a considerable financial problem, discards the bolted cast-iron lining method—pre-eminent for many years in water-bearing strata—in favour of dry joints between precast concrete blocks with no break of joint. Since the last war, the price of cast-iron sequents for tunnel linings has increased from about £6 15s. to about £45 a ton. The Potters Bar tunnels were the first of any consequence in Britain to be driven through clay for more than 40 years.

Modernisation conference

DURING the past week a comprehensive account of the engineering work involved in the plan for the modernisation of British Railways has been presented at a special conference at the Institution of Civil Engineers, which was still in progress when we closed for press. Representatives of transport, and particularly railways, from many parts of the world have attended the conference, which was arranged jointly by the Institutions of Civil Engineers, Mechanical Engineers, and Electrical Engineers. The Presidents of these bodies took the chair at the various sessions, each of which was based on a paper by a chief technical officer of the British transport organisation. Summaries of these papers are given elsewhere in this issue.

The introductory paper was delivered by Mr. R. C. Bond, Technical Adviser to the British Transport Commission, who stressed the fact that the railways still have a vital part to play and will remain an essential element of national transport resources for so long as can be foreseen. The basis of his paper was a survey, in broad outline, of the engineering activities on which the whole modernisation plan depends.

Mr. M. G. R. Smith, Chief Civil Engineer of the Western Region of British Railways, Mr. J. F. Harrison, Chief Mechanical Engineer, British Transport Commission, Mr. S. B. Warder, Chief Electrical Engineer, British Transport Commission, and Mr. J. F. H. Tyler, Chief Signal & Telecommunications Engineer of the Southern Region of British Railways, dealt in greater detail with their own particular fields of railway engineering and with the contributions which were required from each form in the fulfilment of the modernisation plan. Each of the papers was open for discussion and the summing up was entrusted to Mr. John Ratter, Member of the British Transport Commission.

Swiss Federal Railways

THE management report of the Swiss Federal Railways shows a provisional figure of 70 million Swiss francs for the excess of total receipts over operating expenditure for the last quarter of 1960, which is 13·6 per cent more than in the corresponding quarter of 1959. For the whole of 1960 the excess is 297,100,000 Swiss francs or 34·9 per cent more than for 1959. From this must be deducted sinking fund and loan service charges, contributions to pensions and assistance funds, cost-of-living allocations to pensioners, contributions to reserves and interest on capital, the total of which was not available at the date of the report.

The passenger traffic receipts for the year showed an increase of 9 per cent and goods traffic of 15·6 per cent over 1959; the increases are attributable partly to increase in traffic and partly to increases in fares and rates. Operating costs rose by 5 per cent due to increases in staff and the rising cost of maintenance.

The budget for the operating account for 1961, approved by the Federal Assembly on December 15, 1960, estimates total receipts at 1,004,700,000 Swiss francs and expenditure at 768,100,000 Swiss francs. After allowing for sinking fund, loan service, and so forth, a profit of 18,280,000 francs is foreseen.

Claims have been received from staff organisations for a further reduction of working hours, general adoption of the five-day week, special allowances for Sunday working and for irregular hours, a considerable extension of the period counting as night service and a substantial increase in commencing salaries, measures which, it is claimed would overcome recruitment difficulties. Their adoption would cost from 25 to 30 million Swiss francs a year. In December the Federal Assembly granted cost of living increases of 4·5 per cent on remuneration, pensions and insurance benefits. A standard form of contract has been adopted for foreign employees of whom there were 215 at the end of the quarter.

Electronic computing apparatus is on order for accountancy purposes in connection with fares and rates and will probably go into service in April, 1961. A statistical system for loaded wagons, which has been under development for a year and a half, is now finalised and gives rapidly a picture of the whole evolution of goods traffic. A new method of spot checking monthly passenger movements per line, per train category, and per class of vehicle has been introduced.

Contact with public opinion has been maintained in a variety of ways. Representatives of the press have been shown new couchette cars, a marshalling yard at Chiasso, warehouses at Romanshorn, the reconstruction of Berne Station and the first of six new diesel locomotives which will be put into service at

Basle, where there have been complaints of the noise and smoke from steam locomotives. Discussions have been held with the press concerning problems arising from timetables and level crossings. Three television programmes during the quarter were devoted to railway matters.

A special exhibition entitled " The Railway ensures the Country's Supplies " closed on October 31 after being open for three months and being visited by 90,000 people.

The increase in traffic and the longer turn-round time resulting from shorter working hours led to some shortage of wagons. Steam locomotives, of which 129 were in service at the end of 1960, travelled 31,880 km. over electrified sections, 14·9 per cent less than during the corresponding quarter of 1959. Six new diesel-electric locomotives were put into service and six Bo-Bo electric locomotives were ordered. The first heating van equipped to burn fuel oil and for use on international trains was put into service and gave complete satisfaction. As a result the other nine heating vans will be similarly equipped during 1961 and 1962. The locomotive testing plant at Bellinzone was renovated. No new electrification work was undertaken during the quarter.

London Midland summer services

IN recent years there have been complaints from the public as to the late appearance of British Railways summer timetables, which has made it difficult for those going by train on their summer holidays to plan their journeys in advance. No such criticism can be levelled at the Regions in 1961, seeing that the London Midland book, even though it be the last of the six Regional timetables to be published, nevertheless is on sale eight weeks before it comes into operation. The Regional timetable staffs are to be congratulated on the foresight and hard work that has made this achievement possible.

Though engineering work in connection with electrification will continue to impose numerous speed restrictions between Euston and Crewe, the use of diesel power on all the principal expresses has become so general as to permit a substantial reduction of the massive recovery times now in force over this section. As a result, most Down trains from Euston will leave 10 min. later, restoring their departure times to those of last summer, while many Up trains will arrive up to 15 min. earlier. The latter will include the 9.40 a.m. " Mancunian " and 5.55 p.m. " Comet " from Manchester, to be due in Euston at 1.25 and 9.35 p.m., and the 10 a.m. " Merseyside Express," 2 p.m. " Manxman " and 5.15 p.m. " Red Rose " from Liverpool, to arrive at 2, 6.5 and 9.10 p.m. respectively. The 7.55 a.m. from Manchester will start at 8 a.m. and reach Euston at 11.49 a.m. instead of 12 noon, an acceleration of 16 min.

As mentioned in the Scottish Region timetable review, the Down " Royal Scot " and " Caledonian " will start 10 and 20 min. later respectively, at 9.15 a.m. and 3.55 p.m., and be accelerated to a 7-hr. timing to Glasgow, the former by 28 min. (omitting its present Preston stop) and the latter by 25 min. By reason of the later " Caledonian " start, the 3.45 p.m. Down Manchester (*via* Stoke) will leave Euston at 4 p.m. There will be an important rearrangement of the early evening Down expresses. The 6 p.m. " Mancunian " is to start at 5.55 p.m., the 5.40 p.m. " Ulster Express " at 6.10 p.m., and the 6.10 p.m. " Merseyside Express " at 6.20 p.m.; whereas the arrivals of the first and third of these at Manchester and Liverpool at 9.51 and 10.35 p.m. respectively will show accelerations of 5 and 8 min. only, the " Ulster Express " will be speeded up by 18 min. to reach Heysham at 11.17 p.m.

The 7.45 a.m. Down " Lancastrian," starting 10 min. later, will be into Manchester at 11.51 a.m. and Liverpool at 12 noon, accelerations of 20 and 15 min. respectively. The 11.20 a.m. Down Manchester, on the other hand, starting at 11.30 a.m., is to be decelerated by 12 min., for some unexplained reason will be allowed no less than 43 min. to run the 25 miles over the electrified line from Crewe to Stockport, instead of the 25-30 min. of other trains. It will not be due in Manchester until 4.2 p.m.

The later start of the down " Midday Scot," at 1 p.m. instead of 12.50 p.m., and its stop at Crewe to pick up the through Plymouth-Glasgow portion, will benefit this summer's 11.35 a.m. " Lakes Express," which no longer will require to be held at Lancaster to be passed by the " Midday Scot." The " Lakes Express " will thus reach Windermere at 6 p.m., 35 min. earlier, and Keswick at 6.55 p.m., 33 min. earlier. The present 1.5 p.m. Down Perth express will leave Euston at 1.20 p.m., and be 3 min. earlier into Carlisle, at 8.8 p.m. Southbound, as is usual in summer, the 10 a.m. " Royal Scot " from Glasgow will omit its Carlisle stop to pick up passengers and reach Euston 20 min. earlier, at 5.5. p.m.; the 8.30 a.m. " Caledonian " from Glasgow similarly will arrive 20 min. earlier, at 3.35 p.m. The 9 a.m. from Perth will be accelerated 21 min., to reach Euston at 7.40 p.m.

On the North Wales main line, the Portmadoc section of the 11.20 a.m. (last summer 11.15 a.m.) Down " Welshman " will have a curtailed wait at Afon Wen, and so reach Criccieth 44 min. earlier, at 6.25 p.m., and Portmadoc 45 min. earlier, at 6.33 p.m. In the Up direction, the " Welshman " will be 15 min. earlier into Euston, at 6.35 p.m. The Down day " Irish Mail " will be 20 min. faster, leaving Euston (from June 23) at 8.10 a.m. and reaching Holyhead at 2 p.m. In addition to the regular Friday evening non-stop boat express from Euston to Holyhead (this summer at 8.10 p.m.), as last year a second relief will be run from Northampton at 9.20 p.m. and Rugby at 9.58 p.m., non-stop from there to Holyhead.

On the Midland Division, the Sheffield connection with through coaches for the 12.45 p.m. " Pines Express " (to Bournemouth) and 12.52 p.m. to Bristol from Birmingham New Street will start 19 min. earlier, at 10.26 a.m., though 16 min. later than last summer. An interesting development over the West of England main line is the through sleeping car to be attached to the Newcastle-Bristol mail; this will leave Newcastle at 7.5 p.m. and reach Bristol at 4.22 a.m., and in the reverse direction leave Bristol at 7.25 p.m. and be into Newcastle at 4.26 a.m. This facility will be provided from Monday to Thursday inclusive in each week. There will be no other alterations of note on the Midland and Central Divisions.

West of India Portuguese Guaranteed

AS recorded in our April 7 issue, the West of India Portuguese Guaranteed Railway Co. Ltd. has terminated its contracts with the Portuguese Government, with the result that the W.I.P.R. in Portuguese India and the port of Mormugao passed on April 1, 1961, to the Junta Autonoma dos Portos e Caminho de Ferro do Estado da India, a board formed by the Portuguese Government to administer the railways and ports of Goa.

The company was formed as a result of the Treaty of Lisbon in 1878, which provided for a measure of co-operation in Customs and other matters between Portuguese India and British India, and for joint consideration of railway facilities to provide an outlet to the sea for the produce of the neighbouring areas of British India. The railway project was taken up by the Stafford House Committee under the presidency of the Duke of Sutherland and, after surveys in 1879 and 1880, it was decided to establish the company, to build a railway within Portuguese territory from the Port of Mormugao to the frontier; the Southern Mahratta Railway built the line in British India connecting with this. The Portuguese company also was given the responsibility of constructing the port of Mormugao and of carrying the railway for three miles into British India to the junction station, Castle Rock. The contract with the Portuguese Government was signed on April 18, 1881, and construction work began soon after, under Colonel Ernest E. Sawyer. The railway and harbour were opened for use in January, 1888.

The railway, which is single-line metre gauge, runs from Mormugao for about 38 miles inland to Collem, at a level of 240 ft. above sea level, and thereafter ascends the Ghat, rising in 13 miles to a height of about 1,500 ft. above sea level at the frontier. The ruling gradient between Mormugao and Collem is 1 in 100. On the Ghat section, the ruling gradient is 1 in 40, about two-thirds of the length being on this gradient. The sharpest curve is 800 ft. rad., this covering about one-third of the Ghat section. The track was laid with 62-lb. section flat-bottom rails on wood sleepers. In the first 38 miles there are about 145 bridges and culverts, and about 80 on the Ghat section. Of these, six major bridges containing one span of 100 ft. and nine spans of 90 ft. exist in the first 38 miles, and one major bridge consisting of two spans of 90 ft. on the Ghat section. There are also 12 tunnels on the Ghat section aggregating about 6,000 ft. in length, mostly driven through hard trap-rock.

Ten stations were constructed between Mormugao and Collem inclusive, which were opened to traffic, and three more stations were built on the Ghat section primarily for crossing purposes. Trains are run on the block system, originally using Winter's instruments, but later Neale's token instruments. The original locomotives consisted of 15 Kitson 2–6–2 tank engines which were placed on the line from 1884, and withdrawn from service between 1925 and 1932. Three 0–6–6–0 North British Mallet engines were purchased in 1911, and three more in 1921. These, used solely for banking trains on the Ghat section, were later superheated. In 1924 and 1925, 11 Bagnall 4–8–0 " GS " class goods locomotives were purchased and in 1931 four " YD " class 2–8–2 goods locomotives, though these were not used on the railway until 1956. The railway also owned an " FM " class 0–6–0 locomotive, originally built by Neilson in 1884, and purchased from the Madras & Southern Mahratta Railway in the 1930s. This locomotive was last re-boilered in 1948, and is still used for shunting, for which it gives good service. Recently, three Drewry 0–6–0 diesel shunting engines have been provided.

From the date the railway and harbour were opened, the traffic, though small, grew slowly. In 1892 the British Government denounced the Treaty of Lisbon and set up a customs barrier at the Frontier. This seriously affected the through traffic to India, and the growth of earnings ceased. A few years later a rate war started; the Southern Mahratta Railway quoted specially reduced rates for traffic to Bombay over its line via Poona. As a result the W.I.P.R. was worked at a loss until an agreement was reached whereby the W.I.P.R. was enabled to carry via Mormugao a fair share of the traffic offering between British India and Bombay. A further rate war developed, and it was found that the only means of avoiding further losses was for the W.I.P.R. to be managed, " to the best advantage of both companies," by the Southern Mahratta Railway Company of India. A working agreement to this effect was accordingly signed in 1902, from which date the earnings of the W.I.P.R. again showed improvement. At this stage various works were undertaken to improve the system, the cost being found by the Portuguese Government.

This working agreement was extended from time to time until December 31, 1955, when the Southern Railway of India, a state railway succeeding the Southern Mahratta Railway, terminated the agreement, primarily for political reasons. The W.I.P.R. Company then resumed, at short notice, the management of the undertaking, appointing officers from Great Britain and recruiting other staff locally. Workshops for the maintenance of locomotives and rolling stock have been built, additional rolling stock has been obtained and many other improvements carried out since that date.

After the political changes which followed the war, it became clear that the old system of guaranteed railway companies, which had served the Indian sub-continent so well, was moribund, and the political tension between the new Union of India and the Portuguese in Goa, which arose after India became independent in 1947, made considerable difficulties for the company in the early 1950s. When the break occurred in 1955, and the Indian Government dismantled the line on its side of the frontier early in 1956, thus effectually stopping the through traffic on which the company had up till then existed, it was apparent to the company that under its contract with the Portuguese Government, it was necessary to maintain services over the railway and at the harbour and to endeavour to re-establish the undertaking on a sound commercial basis. The Portuguese Government gave considerable assistance in many ways, and by a supreme effort, Colonel C. G. Blackford, the new General Manager, and the small band of officers working with him, brought the system to a high degree of efficiency. The company felt, however, that the ownership and management of a business of this kind belonged properly to the people of the country. As soon, therefore, as it was clear that the difficulties which came to a head in 1955 had been overcome, the company entered into negotiations with the Portuguese Government for the termination of the concession. Two years' notice was accordingly given in 1959 to be effective at March 31, 1961. Thus the last guaranteed railway company in the Indian sub-continent has ceased to operate.

U.S.A. railways begin 1961 badly

FROM A CORRESPONDENT

THIS year opened gloomily for U.S.A. railways, the most extensive system still acting under private ownership and management. In January, 107 Class I railways operated 220,235 miles of road. Compared with the poor year 1960, revenues decreased by $90 million, or 11 per cent, to $699 million. Freight revenue dropped by $83 million, or 12·5 per cent, to $585 million, while passenger revenue declined by $2 million, or 4 per cent, to $53 million, and parcels by passenger train produced receipts of $4·5 million, a fall of 15 per cent. Operating expenses were reduced by $37·6 million, nearly 6 per cent, to $596 million, but the operating ratio rose from 80 to 85 per cent. Though taxes were $110 million, or 12 per cent, lower, equipment rents were $5·8 million, almost 25 per cent, higher. The final result was that the railways as a whole were faced with a loss of $4 million at the end of January, against earnings (before charges) of $43·5 million in 1960.

The results for individual railways varied widely. The number in deficit rose from 25 to 51. The Eastern District was hit hardest, with 23 railways in default. The New York Central headed the list with a deficit of $6·7 million after working 10,260 miles at a ratio of 97 per cent. The Pennsylvania, operating 9,845 miles, held its ratio below 90 per cent, but was nearly 5 million dollars on the wrong side of the account. Its subsidiary, the Wabash, worked 2,420 miles at a ratio of 77·5 per cent and raised earnings by 44 per cent. At the foot of the list, the New Haven, with an operating ratio of 111 per cent, recorded a deficit of $3·6 million, more than 2½ times its 1960 shortage, and is in a desperate plight. The Erie-Lackawanna merger has so far failed to produce economies and the Lehigh Valley, a force in the early years of the century, now sinks deeper into arrears.

The coal roads of the Pocahontas Region hold their own firmly. The Chesapeake & Ohio, operating 5,090 miles at a ratio of 83 per cent, recorded earnings of $2·8 million, 30 per cent below 1960. The Norfolk & Western, reducing expenses and operating 2,750 miles at a ratio of 60 per cent, had the highest earnings of any railway. Its earnings of $4·6 million exceeded those of the Southern Pacific System from 12,050 miles of road. It still pays to carry coal in large volume. Not content with an average wagon load of over 50 tons, the N. & W. is building coal wagons of 85 tons capacity.

The trend of wagon loadings on all U.S.A. railways since January does not point to an early revival in traffic. For 11 weeks to March 18 loadings numbered 5,376,930, a decrease of 1,001,130 (or 15·6 per cent) from 1960.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

THE ENGINEERS' GUILD

April 21

SIR, With reference to your editorial " More Money Required " and the statement issued by the Engineers' Guild reported on page 459 of the April 21 issue of *The Railway Gazette*, the British Transport Officers' Guild received an assurance from the Commission's representative during the recent negotiations, that our special plea for the salary ranges of Railway District Engineers and Assistant District Engineers would be separately examined.

May I emphasise that the British Transport Officer's Guild, which is a party to the Joint Negotiating Agreement with the Commission, is actively pressing for the further examination of the salary ranges of these engineers.

Yours faithfully,

L. W. ORCHARD
Clerk to the Guild

The British Transport Officers' Guild,
Finsbury Court,
Finsbury Pavement,
London, E.C.2

RIDING QUALITIES OF PASSENGER VEHICLES

April 19

SIR, The letter from " Consulting Engineer " in your April 14 issue might have been written by myself, so nearly does it accord with my own views on the subject, over a considerable period.

Up to about 1924-25 the old pre-1914 L.N.W.R. stock (particularly the 12-wheel dining cars) would travel between Crewe and Euston so steadily that not a drop would be spilled from tea or coffee cups filled to the brim, even at 70 to 80 m.p.h. over all the points and crossings at Nuneaton. One could write at the tables as if at one's office desk.

This was achieved, I believe, by the L.N.W.R. type of springing, also possibly by the bogie wheelbase and its position relative to the coach length, and also undoubtedly to the superlative track.

At the same time, Midland Railway coaches were rocking and swaying their way from Manchester to St. Pancras although it is fair to say that vibration type (i) below was not experienced in Midland main-line coaches. When amalgamation took place, L.N.W.R. ideas were pushed aside and there has not been any really steady travelling on any line since then. Speeds during the past few years have in general not been higher than the earlier speeds (compare London-Manchester timetables of 1913, 1925, and 1950-60).

The nearest approach to L.N.W.R. steadiness in 1924 was on the Kings Cross-Doncaster line.

On the rare occasions when L.N.W.R. coaches were allowed to get into bad running condition (and they were nearly all old in 1924) there could be (i) a high periodicity vibration making the cutlery shiver and jingle on the tables or (ii) a slight side-to-side jerk felt at each end of the coach, but still without rolling or swaying. Incidentally, I noted vibration-type (ii) recently in a new coach between Crewe and Euston each time we ran on to a stretch of continuous rail. It disappeared again on the ordinary 60-ft. lengths.

The restaurant or buffet car now often seems to be the worst riding coach in the train, whereas it should be the best, and this applies on locomotive-drawn stock from Waterloo, Paddington, Euston, St. Pancras, and Kings Cross.

In a letter in your March 3 issue, Mr. D. A. Avner expresses a wish for modern designs to secure better running. Before it is too late, I would like to suggest that old L.N.W.R. engineers be dug out of retirement to tell their present-day colleagues how they did it.

I write purely as an interested and observant passenger who still likes rail travel.

Seat design is another aspect of comfort of which I have taken much note and I hope to write again on that topic.

Yours faithfully,

E. R. SANDERSON

Larch Rising, Quarry Road,
Oxted, Surrey

RAIL TRANSPORT TO LONDON AIRPORT

April 25

SIR, I was interested to read in your issue of April 7 the views of London Transport on the suggested extension of the Underground line from Hounslow West to London Airport, but was disappointed at the apparent reluctance to build and operate this line.

Before the present development of the airport, the Hounslow line carried heavy traffic to town in the morning and back in the evening, but was lightly used for the rest of the day. There now is considerable additional traffic to Hounslow for the airport in the morning and back to London in the evening, thereby providing traffic for the trains in both directions during peak periods and, because the airport is active 24 hours a day, further additional traffic throughout the day. It is a reasonable certainty that increasing air travel will bring even more passengers to this line and it is also very probable that a higher proportion of travellers to the airport would use this method of transport if London Transport provided a through rail service in place of the present service which involves the inconvenient and time-wasting change from train to bus at Hounslow West. Yet London Transport suggests that still higher fares should be charged if receipts are to be sufficient to cover working expenses. Can we be told how many passengers a day at present fares would be required before an electric railway operated by London Transport would pay its way ?

The estimated cost of £12 million for a 3¼-mile extension seems very high, and I wonder if this includes the escalator or travolator at Gloucester Road mentioned in the letter ? This surely is only needed if the line is not extended. If the extension is built, plane passengers could travel direct between London and the airport by Underground and would not need to change to and from coaches at the Gloucester Road Air Terminal. Has the saving from the reduction or elimination of these air-line coaches been taken into account in calculating the financial return on this extension ? There would also be a considerable reduction in the number of London Transport buses needed between Hounslow and the airport which, with the present shortage of bus crews, could usefully be employed on other routes in the district. Has this saving also been taken into account ?

I think that the provision of a rail service to London Airport is urgently required, but the letter from London Transport seems to suggest that the L.T.E. is more interested in finding excuses for not building it rather than reasons for getting on with the job of providing easier and quicker travel for many of their passengers.

Yours faithfully,

J. MORLEY

124, Byron Avenue,
Hounslow, Middlesex

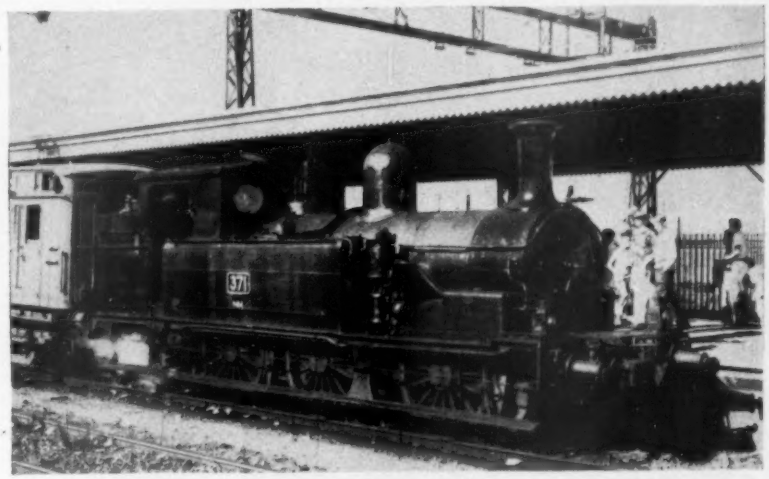
The Scrap Heap

Off-beat park

A colleague was paying a call in an industrial town and was faced with the usual difficulty of finding a parking space. Suddenly he noticed a car pulling out from a packed line of others on ground to the side of the road. With a burst of acceleration, he secured the vacant spot, into which he quickly backed. It was now early afternoon. Work completed, a few hours later, he went in search of the car, now standing alone, and was alarmed to find a card under the windscreen wiper. On it was written: "Please do not park on railway lines as the engine is obstructed and we have already had to pay two days demurrage. Thank you." Sure enough, the car was astride the sunken tracks. *From "The Autocar."*

Last of its kind

The tank locomotive illustrated is "E" class 0–6–2 type No. 371 and is the only remaining one of its class on the official register of the Victorian Government Railways. It is the last of a long line of these locomotives originating from a 2–4–2 inside cylinder pattern engine, built in 1888, by Kitson & Company, of Leeds. Between 1889 and 1894 the Phoenix Foundry of Ballarat built 45 of these locomotives, while another 25 were built by the Melbourne Locomotive & Engineering Works Both these firms are now defunct. The 2–4–2 "E" class locomotives gave outstanding service for 30 years in hauling Melbourne's ever-growing suburban passenger traffic prior to electrification which took place mainly in the nineteen twenties. They were then used as shunting locomotives and the wheel arrangement altered to 0–6–2 on all except one, which is preserved at the Newport Workshops. Gradually their numbers dwindled as other locomotives replaced them, and with the coming of the "W" class diesel-hydraulic locomotives the days of shunting by steam power are nearly over.



Last of the Class "E" 0-6-2 locomotives of Victorian Government Railways

Hot seat

On April 12, a German boy aged 2 yr. 11 months was rescued and taken to hospital for examination after he had been found sitting between two rails—one "live"—near High Street Kensington on London Underground tracks. He suffered from very slight burns to his fingers where he had apparently touched the live rail, but otherwise was completely unharmed. He was wearing sandals with thick rubber soles which apparently had saved his life.

Times have changed

On April 10, Alderman John Armitage, 76, a former mayor of Huddersfield, who spent 50 years on the railways, stated: "I just don't know what the answer is to the problems of the railways. It seems that many railwaymen lack incentive. Probably money is the cause, but it never used to bother us. I hear these days of engine drivers leaving the railways to take labouring jobs at more money. It would never have happened in the old days." Alderman Armitage commenced work at 9s. a week on the former London & North Western Railway.

[Reproduced by permission of "Punch"]

"It's a sad story. He used to pop in for a quick one and catch the 6.15*; that was cancelled and he then used to have three and catch the* 6.48*; then that was . . ."*

Once bitten, twice shy

"There will be no more wheelchair raids on our trains," stated a train guard in the Southern Region of British Railways recently. "In future, wheelchair passengers will need a permit from the stationmaster. This has always been the rule—but from now on, guards will not have soft hearts. If a wheelchair passenger arrives in a hurry for a train without permission, that will be just too bad. We will not take him." *The guards' decision arose from a recent train robbery which was carried out with the aid of a bandit disguised as an invalid in a wheelchair.*—ED., *R.G.*

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

ARGENTINA

Appointment of advisory committees

For each of the six Argentinian railways, seven advisory committees have been appointed by the Minister of Public Works & Services. Each committee consists of five members, three nominated by the railway administration and one each from the two railway unions.

Fiat railcars

On a recent trial trip over the 250-mile section between Constitución and Mar del Plata two new 5-ft. 6-in. gauge Fiat railcars completed the run in 4½ hr. with a maximum speed of 76 m.p.h.

Photo] *J. O. Slezak*

Russian passenger train

U.S.S.R.

Typical Russian locomotive

The illustration shows a passenger train at a Ukranian station on the U.S.S.R. railways. The locomotive is a 2-6-2 Class "S," a typical Russian design. Note the characteristic railings along the boiler.

CANADA

Breaches in British Columbia

Recent washouts and landslides caused havoc on the 27-mile section of the Canadian Pacific main line between North Bend and Yale in British Columbia. Mountain-slides and washaways resulted in 18 breaches, the largest at Saddle Rock being 220 ft. long and 55 ft. deep. Freight traffic had to be diverted over the Great Northern lines in the United States *via* Grand Forks, and passengers were carried by air between Calgary and Vancouver. In many places the track hung suspended in the air across chasms. Diversions, and fills together with the provision of substitute bridging, entailed much heavy engineering work. This section is in the famous scenic area of Fraser Canyon.

PUBLICATIONS RECEIVED

No Warning Light for Wear. This 16-page publication from Rocol Limited gives a full explanation of the development of oil additives and the production of Rocol Molyspeed, the first molybdenum disulphide oil additive to be made available to the British motorist. There is also a section devoted to the uses of other Rocol molybdenised lubricants. Copies of the booklet are available on request from Rocol Limited, General Buildings, Aldwych, London, W.C.2.

The Last Main Line. Leicester: City Museums, New Walk. 8½ in. x 6½ in. 26 pp. Illustrated. Price 4s. 6d.—When the Manchester, Sheffield & Lincolnshire Railway built its 100-mile London extension from Annesley Junction in the 1890s, and became the Great Central Railway, it established a main line to the Metropolis which has earned the title of this booklet, more than 60 years later. In 1894, when construction began, Mr. S. W. A. Newton had recently joined the family photographic business in Leicester, and he made a photographic record of major importance comprising more than 1,000 negatives. This collection he gave in 1959 to the City of Leicester Museums, shortly before his death. The brochure is attractively produced and contains good reproductions of 37 plates, with introductory notes by Mr. R. D. Abbott, a map, and a facsimile of the cover of the first G.C.R. London timetable, dated March 15, 1899.

Spire Speed Nut Manual. The latest edition of this manual, which is issued by Simmonds Aerocessories Limited, Treforest, Pontypridd, Glamorgan, covers recent developments in the range of spring steel fastenings produced by this company. Contents include fully-dimensioned blue-prints of each part and tabulated details. Oversea editions are available with introductory matter and specifications in seven European languages.

Evershed F.H.P. motor leaflet. Evershed & Vignoles Limited, Acton Lane, W.4, has published a new servo-motor and motor-generator leaflet which gives brief details of the range of Evershed motors now available. This includes a.c. and d.c. servo motors and motor generators; special-purpose motors; tacho generators; gearheads; torque-transmission units and amplifiers and power units. Copies are available on request.

Radiation Protection Catalogue. A catalogue of radiation protection materials, equipment, and accessories, is available from Research & Control Instruments Limited, 207, Kings Cross Road, London, W.C.1. Materials are listed suitable for every type of laboratory, production, or site work, and the firm's advisory services described.

One end of the restaurant and lounge bar at Bradford (Forster Square) Station

THE WEST RIDING GRILL AND BAR

Restaurant and lounge bar completes catering facilities at Bradford (Forster Square) Station

A RESTAURANT and lounge bar was opened by the Hotels & Catering Services of the British Transport Commission on April 19 at Bradford (Forster Square) Station. Together with the existing cafeteria, which was modernised in 1955, it provides completely up-to-date catering facilities.

Entered from the station concourse, the new room comprises lounge bar and dining room combined. A new kitchen, staff rooms, and ladies' and gentlemen's toilets have also been provided.

Travellers can obtain a combined counter service of drinks and a waitress service of special grills and light meals. The menu includes hors d'oeuvres, iced melon, salads, a variety of grilled steaks and chops, tea, coffee, soft drinks, wines, liqueurs, and a wide range of beers and spirits.

Hours of opening

"The West Riding Grill and Bar" can seat 38 people and is open from 10 a.m. to 10 p.m. on weekdays, during the winter, and 10 a.m. to 10.30 p.m. in the summer. On Sundays, all the year round, the room will be open from 12 noon to 2.0 p.m., and from 7.0 p.m. to 10 p.m.

The opening of this room represents a further stage in the programme of improvement to the Commission's hotel and catering establishments throughout the country. To date, major modernisation has been carried out at over 100 of the 260 railway stations where catering is operated by the British Transport Hotels & Catering Services.

Built-in blue leather upholstered seating runs around walls panelled with natural Honduras mahogany, finished with Spurlac matt lacquer. Chairs are of mahogany upholstered in red leather, and the wooden tops of the tables have been specially treated to withstand damage and dirt. Curtains carry a colourful, modern pattern and light fittings are of simple design calculated to add to the overall effect of spaciousness. The room is fully air-conditioned.

Extensive use of mahogany

Mahogany panelling is continued round the lounge bar, which has chairs upholstered in blue and coffee tables with tops of flame-coloured plastic. Mahogany is

The new restaurant showing grill and bar areas

also used for the bar counter, which is finished with a padded leather front. It is fitted with a stainless steel foot-rail and a recessed shelf for customers' belongings. In addition to the usual bar equipment there are cooling shelves and a refrigerator cabinet for white wine. There is also a special system for cooling draught beer.

The ladies' toilet, which has a small powder area, has a Lionide mural-effect wall finish, and the doors are faced with Fresco blue Warerite.

Black-tiled walls surround the grill area, which contains modern cooking equipment and incorporates a refrigerated display unit.

Stainless steel equipment is used extensively in the kitchen. Floors and walls are tiled throughout and the ceiling is panelled in asbestos. Staff rooms for men and women are well equipped and decorated.

The general contractor for the scheme were Sharp & Law Limited, and the entire work was carried out under the direction of Mr. S. P. Smith, Chief Works Officer, British Transport Hotels & Catering Services.

Sub-contractors were as follow:—

Floor tiles—ceramic	Langley (London) Limited
Plastic tiles ...	Krommeni-Flooring (U.K.) Limited
Wall tiles	Carter & Co (London) Ltd.
Ironmongery ...	Alfred G. Roberts (Exports) Limited
Photomural ...	Autotype Co. Ltd.
External signs ...	Sign Centre Limited
Beer pump and beer cooling	Gaskell & Chambers Limited
Light fittings ...	Anne Storm and Tucker & Edgar, Troughton & Young
Stainless steel equipment	John Drummond & Sons Ltd.
Electric wiring throughout	Arthur R. Farrar & Co. Ltd.
Refrigerated shelves	Lightfoot Refrigeration Co. Ltd.
Refrigerated cold display.	
Ventilation and air-conditioning	H. Morfit & Son Limited
Lift	Shorts (Lifts) Limited
Curtains	Edinburgh Weavers
Dining chairs ...	Birch & Alpe Limited
Tables	Mitchells (Millbrook) Limited
Lounge chairs ...	Parker Knowle Limited
Carpets	Carpet Manufacturing Co. Ltd.
Cooking equipment	William Page & Co. Ltd., W. M. Still Limited, Cona Limited
Leather	Bridge of Weir Leather Co. Ltd.
Plastic materials ...	Warerite Limited
Walls and floor tiling	Stanbury Tiling Co. Ltd.
Electric incinerators	Hyginette Manufacturing Co. Ltd.
Paint and lacquer ...	Williamsons Limited

TAMAR SUSPENSION BRIDGE

Devon-Cornwall main road link near Brunel's Royal Albert railway bridge

A NEW road bridge across the river Tamar, on which work was commenced in August, 1959, is scheduled to be open for traffic this August. The bridge which is situated near Brunel's Royal Albert railway bridge, and which will link Plymouth, in Devon, and Saltash, in Cornwall, was designed by Mott Hay & Anderson, on behalf of the Tamar Bridge Joint Committee.

Suspension on wire rope cables

Cables, each consisting of 31 wire-ropes, will be supported by two concrete main-towers 220 ft. high, and two side-towers about 80 ft. high. In all, nearly 4,500 miles of wire will be used. From the cables will be suspended three spans of the bridge structure, the centre-span being 1,100 ft. and the two side-spans 374 ft.

The steel bridge structure, protected by zinc spraying, will carry a concrete roadway and footpaths 45 ft. wide, and steel approach spans will carry the road on to the bridge at each end.

The steelwork is being fabricated and erected by the Cleveland Bridge & Engineering Co. Ltd., and special arrangements have been made by the North Eastern Region of British Railways for its conveyance from Darlington to the site. A special freight train carried the 12 lattice cross-girders, which were loaded on to bolster-wagons by an overhead Goliath crane at the company's sidings.

Steel girders from Darlington for the Tamar suspension bridge

BENGUELA RAILWAY NEW BRANCH LINE

The Benguela Railway Company, an Anglo-Portuguese enterprise financed by Tanganyika Concessions, has been granted a concession by the Portuguese Government for the construction of a 40-mile branch line from Robert Williams to Cuima. The purpose of the new branch is to provide a rail route for exports of iron ore from Cuima through the Atlantic port of Lobito, 247 miles away by 1962. Exports of iron ore in 1957 totalled 88,357 metric tons, and in 1960, 440,071 metric tons.

DISTRIBUTION TO STOCKHOLDERS REFUSED

The registrar has refused an application by United Railways of the Havana & Regla Warehouses (in liquidation) for leave to make a further distribution to stockholders. An appeal is being made which it is hoped will be heard on May 30 so that a statement can be made at the annual meeting which will be held on that day.

RAIL ACCIDENT IN TURKEY

At least 13 passengers died as a result of a collision between two trains at Kartal, near Istanbul, on April 30. Ambulances carrying victims from the Asian side to hospitals on the European side of the Bosphorus filled the ferry-boats. The accident occurred when a local train ran into the rear of an express from Adana. Three coaches were smashed.

RAILWAY MODERNISATION CONFERENCE

ENGINEERING ASPECTS

Summary of a paper by Mr. R. C. Bond, Technical Adviser, British Transport Commission

IN HIS paper entitled "The Engineering Aspects of the Modernisation Plan for British Railways," Mr. R. C. Bond, Technical Adviser, British Transport Commission, dealt in broad outline with the main engineering aspects of the plan. These are very wide in scope and of great variety.

Nowhere more than on a railway, Mr. Bond pointed out, does success in attaining an operational objective depend upon close and continuous collaboration between all departments, and an understanding of the other man's problems. It was perhaps in recognition of this vital fact that the three institutions had been prompted to meet together to discuss this important combined engineering operation, to which all branches of the profession are contributing equally.

Vital rôle of railways

Notwithstanding the growth of road transport, railways have a vital part to play and will remain an essential element of national transport resources for so long as can be foreseen. The future of any undertaking which by general consent is essential to the daily life of an industrial community, can be assured only if it is efficient and up to date in every sense of the word. This implies that the plant and equipment must be constantly renewed with units embodying the most advanced design that engineering achievement makes possible. Modernisation thus is, or should be, a continuous process if the ability of an undertaking to meet its obligations is not to be impaired.

The most important single feature of the plan, and the one which has the most far-reaching consequences, is the replacement of steam as the predominant form of motive power by electric and diesel traction. The reasons were outlined which led to this fundamental change in policy, particularly so having regard to the high standards of performance of which British Railways steam locomotives continued to show themselves capable, to the developments which were still in hand, and to the very limited experience which had been gained with main-line diesel locomotives in Britain, at the time the decision was taken.

In respect of standard of performance and reliability, electric traction is the best means yet devised for operating a major railway system. From a review made by a joint committee of the Railway and London Transport Executives, it appeared that about 4,000 route-miles carry traffics which, at their present and probable densities, are well above the level at which a sound economic case for electrification can be established. The ultimate objective must clearly be to extend electrification to all routes on which it can be financially justified. But electrification nearly always involves heavy civil-engineering work on track and structures in the provision of overhead or third-rail power supplies. Consequently, conversion of a route to electric operation is a complex and lengthy operation. Some disturbance to normal services is unavoidable during the progress of the work. For this and other reasons there is a limit to the amount of electrification which can be undertaken at any one time.

Relative ease of dieselisation

Diesel traction can be introduced much more rapidly than electrification because, being self-contained, diesel units do not depend for their power upon the completion of heavy civil-engineering works. The physical limitations to the rate at which diesel traction can be extended are those imposed by production capacity, the provision of essential maintenance facilities, and training of staff.

Much of the work being undertaken by the Civil Engineering Department is influenced by the change of motive power allied to higher speeds and more intensive services, and the imperative need to reduce maintenance costs. It can conveniently be divided into two broad categories—route modernisation to permit higher average speeds with any form of traction, and that connected directly with electrification, as such. The former embraces a wide variety of permanent way and structural work, including the provision of flyover and burrowing junctions, and realignment of curves and junctions to ease or eliminate speed restrictions.

Experience in other countries has shown that diesel and electric locomotives with heavy axle loads, and wheels substantially smaller in diameter than steam locomotives, impose increased stresses on the track which can result in higher maintenance costs and shorter life. To counteract these tendencies it was clear that the track improvement policy already adopted would require some further development. Preparation of the track in advance of widespread diesel and electric traction by formation strengthening, improved drainage, and deeper ballasting is considered to be essential. It was further decided that elimination of rail joints wherever practicable would help to avoid increased track-maintenance costs and reduce the possibility, otherwise present, of a substantial shortening of track life.

Fast and intensive services

Higher speeds and more intensive services are two of the objectives of the modernisation plan, the attainment of which depends not only upon the provision of suitable motive power and braking equipment, but also upon the characteristics and capacity of the lines over which the improved services are to be operated.

Apart from the large amount of work entailed in planning and installing completely new signalling schemes, which are an essential part of every project involving alterations and additions to the track layout, much of the work which the Signal Engineering Department has been called upon to undertake has arisen from the need to increase line capacity over many routes to accommodate the faster and more intensive service envisaged in the future, whether hauled by diesel or electric locomotives.

Efficiency versus cost

While the railways have always been able to take advantage of the results of research and development undertaken by the suppliers of their plant and equipment, there remain many problems in attaining the highest efficiency of use and the lowest maintenance costs which can be solved only by research, trials in service, and subsequent development by the railways themselves. There is thus in progress, as a normal part of the day-to-day activities of the engineering and

research departments, a large programme of work, mainly directed to the ultimate reduction of maintenance costs, and all of which is relevant and of direct application to the modernisation plan.

In concluding his review, Mr. Bond said that it is important to regard the modernisation plan not as an end in itself but rather as one of a number of means to the end of restoring and maintaining the operations of British Railways, essential to the life of the nation, on a thoroughly efficient basis. Not only must the railways provide greatly improved services but they must do so at rates and fares which will ensure a continuing volume of traffic in scale with the capacity of the system. It is thus vital that the objectives of the plan should be attained in ways which will improve services and reduce costs.

ELECTRIC TRACTION

Summary of a paper by Mr. S. B. Warder, Chief Electrical Engineer, British Transport Commission

MR. S. B. WARDER, Chief Electrical Engineer, British Transport Commission, opened his paper with a short historical review of events leading to the present situation. It had become apparent that the inflation which followed the war had made the 1,500-V. system less financially attractive because of increased costs of labour and materials, and there was a general trend toward higher voltages to offset this tendency. The situation in Britain was that there was an efficient and extensive 660-V. third-rail d.c. system, too large to change, and the beginnings of a 1,500-V. d.c. system which, because of the high cost of its fixed equipment, was likely to be limited in its application. This latter system had been accepted as standard for Britain after the deliberations of three separate committees spread over many years, and from which few practical schemes resulted.

Reassessment of projects

The ever-changing technical field required a reassessment of electrification projects. There had been significant developments in methods of converting a.c. to d.c. and in the use of national industrial-frequency power networks; better understanding of high voltages and methods of insulation, and new automatic remote-control systems. It was recognised about 1954 that the light fixed equipment associated with 25kV., together with a newly-available method of a.c./d.c. conversion provided a practical means of combining the best features of a.c. and d.c. systems together.

Governing factors

It seemed clear that such a system was ideal where the traffic was light or infrequent, but the electrification of lightly-loaded lines was of little interest to British Railways, for the main justification for any kind of electrification rested on a high traffic density, and diesel traction offered a more readily available alternative. At that time, experiments with 50-cycle traction were taking place in France and in England, although the French experiments, being larger, had greater momentum and consequently established a substantial advance on the work in Britain. When the S.N.C.F. went on to electrify the Valenciennes–Thionville line, and at Lille in May, 1955, disclosed the enhanced performance of a.c. locomotives over d.c. on a ton-for-ton basis, it was sufficient to convince designers in Britain that the French performance could be reproduced here with a corresponding reduction in the cost of a locomotive for a given duty. Thus, a reassessment of the choice of system for Britain was clearly necessary and had to be made.

An important element in the choice of system was the decision to convert the existing 1,500-V. d.c. system. It was found possible to operate this system at 6·25kV. a.c. without substantial alteration. The adaptation of the rolling stock to operate at either 25 or 6·25kV. was relatively simple, the additional complication being more than compensated by the benefits which would flow from savings in electrical clearance not then necessary for the higher voltage. From this point, it became relatively easy to establish that the cost of making this conversion could be more than recovered by the greater flexibility and extensibility of the a.c. system.

Reduced costs

Proceeding to describe the power supplies and fixed installations for a.c. electrification on British Railways, the paper stated that the cost of electrical clearance, which was such a large element in the overall cost of the fixed equipment, would be sharply reduced by the new techniques, which had been stimulated by the special circumstances. An example quoted was a special butyl rubber mat, 6 ft. 6 in. wide, which could be made in any length to serve as an insulated lining at bridges and tunnels where sufficient clearance could not be provided by raising or lowering the track, and where it was not possible to reduce the voltage. This permitted the passage of a pantograph collecting 25kV. power within a clearance substantially the same as that normally permissible for 6·25kV. This, and similar developments, the paper stated, proved the certainty of a considerable reduction in the cost of overhead line equipment in the present schemes as they were extended.

Further sections of the paper gave details of rolling stock and locomotives for the a.c. system. Concerning dual voltage operation, it was stated that this was an undesirable complication from the point of view of the additional apparatus and consequent expense, but that, in the event it had proved to be singularly effective and reliable. Furthermore, the experience gained so reluctantly might, in the long run, prove to have applications in a wide variety of interests. It was noted elsewhere in the paper that the coasting distance at a voltage change-over point was about 400 ft. at present, but in future arrangements it would be about 200 ft. There was no loss of speed and the driver was only aware of what happened by the momentary disappearance of the light indicating power supply on his driving desk. The dual-voltage system thus created no operating problem.

Unique test programme

Advantage had been taken of development in computers and electronics to organise a unique test programme. This was no less than to record simultaneously and automatically information from all parts of the system while trains were running. Analysing recorders had been installed on trains and at selected points in the supply and distribution system. These were capable of sampling up to 12 different quantities every two seconds.

While the recorders only accepted inputs as d.c. voltages, they could be used in association with translators where the inputs originated in other forms, such as movement of vehicles and overhead equipment.

Success of Southern electrification

While the paper had been primarily concerned with the a.c. system because of its historical importance, Mr. Warder concluded, nobody questioned today the technical, operational and commercial success of the Southern Region electrification What had been done there could equally be achieved on the main lines of British Railways, which had a still greater potential in terms of traffic density to exploit.

MECHANICAL ENGINEERING

Summary of a paper by Mr. J. F. Harrison, Chief Mechanical Engineer, British Transport Commission

IN HIS paper entitled "The impact of mechanical engineering on the British Railways Modernisation Plan," Mr. J. F. Harrison, Chief Mechanical Engineer, British Transport Commission, outlined the policy toward standardisation and limitation of locomotive types, subsequent to the pilot orders placed widely over the British locomotive industry. In 1955, 174 locomotives were ordered, incorporating eight makes of engine, from seven locomotive builders. During the first six months of 1960 orders were placed for 359 locomotives, using three makes of engine, from four builders. Of the diesel engines supplied, for main-line use, 397 are high-speed, i.e., 1,200 r.p.m. or over, and 1,256 are medium speed. In the case of shunting locomotives, 534 are high-speed and 1,467 medium speed.

Of a total of 1,653 main-line units, 1,400 have electric transmission and 253 are provided with hydraulic transmission. In the case of shunting locomotives the corresponding figures are 1,372 and 115.

Experience with the Type 1 locomotive having single bonnets and a single cab has limited one-man operation, due to restricted vision. New designs are now under consideration to permit a raised cab with low bonnet to give all-round vision.

The Type 4 locomotive

The Type 4 locomotive was developed with the 1-CC-1 wheel arrangement at a weight of about 130 tons. This was not a mistake, but the only way at the time of combining available medium-speed engines, train heating, and 18½ tons axle loading. Besides being uneconomically heavy, these locomotives will not traverse vehicle humps in marshalling yards, so that their full usage in mixed-traffic working is limited. Future locomotives of this type will therefore be of CC wheel arrangement within a weight of 114 tons, having either one slow-speed or two high-speed engines.

All locomotives liable to be used for passenger or mixed traffic had to be provided with boilers and water tanks for heating. Besides adding cost and weight it is difficult for boilers so restricted in available room to become fully reliable. It has accordingly been decided to dual fit main-line carriage stock with electric heating, and, when this has been done, to obtain all future locomotives and to convert existing ones to provide electric heating current with 800 V at the bus-bar. The most economical way of doing this is by an auxiliary heating generator driven from the main engine.

Casualty comparisons

So far as it is possible to extract like-for-like steam and diesel figures, eliminating from the latter types which are the subject of special development trouble, the miles run per casualty is not widely dissimilar. There is no reason to think that in the near future, and especially after the elimination of steam heating, the incidence of casualties will not show an improvement over that usual with steam.

Experience in service has shown that no clear choice between high-speed or medium-speed engines, or between electric and hydraulic transmissions has yet emerged.

After describing some of the problems encountered with the braking of diesel locomotives, reference was made to the disc brake. This brake has great potential in eliminating shoe renewals over long periods, and can be arranged to give much improved heat dissipation. Another advantage is the ability to provide the whole of the gearing above the axle, simplifying problems of wagon handling.

Common suspension criteria

With increasing means of measurement and analysis of displacements, acceleration, and frequencies, and following upon a close theoretical exploration of first principles, a stream of thought is now emerging which seeks to set up common suspension criteria for any mechanical assembly of bogie components. This covers not only suspension parts such as springs and links, but also simplification, wearing parts, and limits of wear. A number of bogies have already been dealt with experimentally with most promising results, and one of these is shown in the diagram below. The principles now being applied were described.

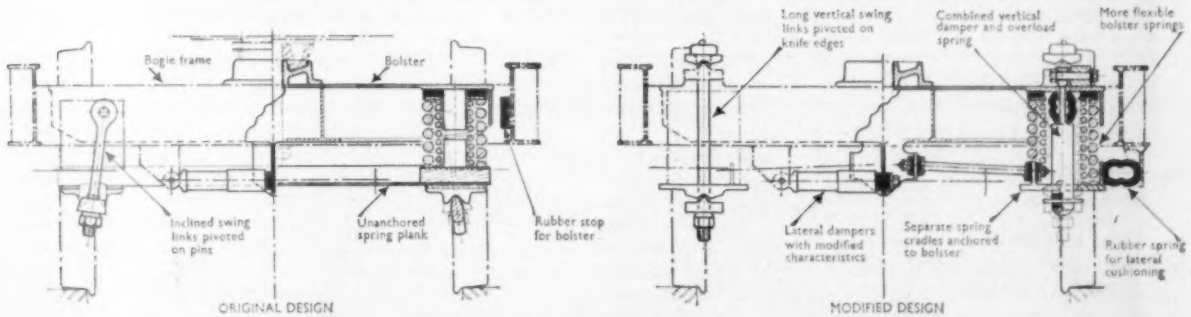
The experience of British Railways in their efforts with light-alloy cars did not indicate specifically that for a saving of 2¼-2½ tons in coach tare weight an additional £1,300 to £1,400 per vehicle was entirely justified, particularly since the corrosion that might be expected with surface stock was an unknown factor.

It was clear, however, that if a tare-weight reduction of 10-12 tons, or 33 per cent, could be obtained at an economic cost there would be quite dramatic possibilities in the economies that could be effected.

The Commission attaches the greatest importance to the future of plastics for integral coach construction. It is calculated that a plastic coach costing 60 per cent more than a mild-steel vehicle would indicate fuel and maintenance savings sufficient to justify the additional capital outlay, but clearly plastic production on a large scale would reduce capital costs to show substantial savings over mild-steel vehicles.

Workshop modernisation

Describing the effects of modernisation on workshops, Mr. Harrison said that based upon experience elsewhere, and covering small- and medium-duty mixed-traffic locomotives, mileages of 150,000-300,000 miles between top overhauls, and up to 1,000,000 miles between general repairs of the diesel engines could well be expected eventually, while the man-hour content of the maintenance of the mechanical parts is likely to be low. For express passenger locomotives, however, comparable figures of 250,000-450,000 miles between top overhauls,


Bogie frame
Bolster
Inclined swing links pivoted on pins
Unanchored spring plank
Rubber stop for bolster
ORIGINAL DESIGN
Long vertical swing links pivoted on knife edges
Combined vertical damper and overload spring
More flexible bolster springs
Lateral dampers with modified characteristics
Separate spring cradles anchored to bolster
Rubber spring for lateral cushioning
MODIFIED DESIGN

Modifications to railcar driving bogie

and up to 1,500,000 miles between general repairs might be expected.

The success of the Modernisation Plan depends upon not only the provision of motive power more powerful than steam, more easily and comfortably operated, with a much greater potential availability and reliability than steam, and with reduced maintenance costs per mile, but also on the ability of the operator to make use of the improved availability by an entirely new conception of locomotive diagramming. When it is remembered that today an electric locomotive with regenerative or rheostatic braking can work for six weeks or more without even visiting a maintenance depot, the potentialities of usability are very evident.

SIGNALS AND TELECOMMUNICATIONS

Summary of a paper by Mr. J. F. H. Tyler, Chief Signal & Telecommunications Engineer, Southern Region, British Railways

AFTER describing the general principles of modern signalling, Mr. Tyler discussed colour-light signals which increased line capacity; signalling control panels; marshalling yards; lifting barriers at level-crossings, and the new automatic warning system of train control. He also gave a brief indication of the geographical scope of the new signalling works.

Part of his paper dealt with the impact on signalling and telecommunications of electrification at high voltages. In itself this necessitates colour-light signalling because the overhead traction structures are a hindrance to the sighting of oil-lighted semaphore signals. But there are also the important technical difficulties of direct and inductive interference. Direct interference creates a problem for track-circuit equipment, and inductive interference is a problem for line-side circuits.

Traction return current

Mr. Tyler first discussed the effect on a single-rail d.c. track-circuit of traction return current in the common rail. This causes an a.c. 50-cycle voltage to be impressed across the track relay and the feed-end equipment. The first step was to render the relay as immune as possible to the effect of applied a.c. by the addition of a magnetic shunt and copper slugs, and to add chokes in the feed set. More elaborately, a voltage-comparison relay can be introduced at the feed end. If the choke becomes short-circuited and the voltage across the track-feed rectifier increases because of traction a.c., the relay drops out and disconnects the d.c. feed to the track circuit.

Nevertheless, the greater the length of a single-rail track-circuit, the greater will be the a.c. voltage impressed across the relay under track-occupied conditions. Having regard to fault conditions, the maximum length of a single-rail d.c. track-circuit is about 500 yd. in 25-kV. areas, and 200 yd. in 6·25-kV. areas.

Double-rail track circuits

In heavy-current traction areas, as many rails as possible must be retained for traction return purposes. This necessitates the use of double-rail a.c. track-circuits.

One form of double-rail track-circuit for 50-cycle traction areas consists, at the feed end, of a static convertor with an output supply at 75 cycles derived from an input at 50 cycles. At the relay end, a frequency discriminator rejects 50 cycles, but accepts 75 cycles. This discriminator consists of a saturable transformer which ensures that the input voltage to the filter is limited. Thus, even under the severest fault conditions, insufficient 50-cycle current is passed through the filter to operate the relay. The filter output is rectified and applied to a standard d.c. track relay.

Impedance bonds

This type of track-circuit requires impedance bonds to enable the traction current to pass from one track-circuit to the next.

This equipment can be fed from any convenient a.c. 50-cycle supply, and track-circuits of these types will be found in general between main stations. Mr. Tyler describes methods of arranging them to allow for the fact that the static-convertor track-circuit is not "phase-sensitive."

At large interlockings, where it is economical to provide a separate signalling supply, it is usual to instal 83⅓-cycle generators driven by a 50-cycle synchronous motor fed from the commercial supply. There are two 83⅓-cycle generators in each set, one to feed the track circuits and the other to feed the local windings of the track relays. The supply cables for the latter contain individually - screened conductors to prevent the 83⅓-cycle supply from becoming contaminated with induced 50-cycle voltage from the traction system.

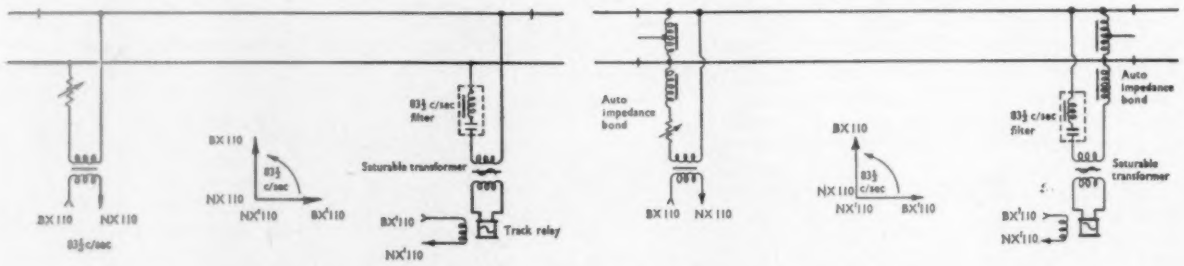
The diagram shows typical arrangements of 83⅓-cycle single- and double-rail track-circuits. The two separate 83⅓-cycle power supplies are generated in quadrature, thus enabling a resistance feed to be used. The relay track-winding circuit includes an 83⅓-cycle filter and voltage-limiting saturable transformer.

Multicore cables

Line circuits are placed in multicore cables, whose individual conductors it would be uneconomical to screen. Therefore, they are generally d.c. with their relays and other apparatus immunised against the 50-cycle a.c. traction current. Induced voltages cannot be avoided, but must be kept below 110V. under normal conditions. This corresponds to about 440V. under traction fault conditions. The maximum exposure to the overhead traction system is limited, by relaying the circuits concerned, to about 1,000 yd.

The same principles of immunisation apply to point machines and controllers and to searchlight signals.

Overhead telegraph routes would be exposed to induction from the electric field around the 25-kV. catenary system, and to electro-magnetic induction resulting



(Left): Single-rail and (right) double-rail 83⅓-cycle track circuit

from the traction current in the catenary. Therefore, they have had to be replaced by metallic-sheathed cable. This has necessitated the adoption of a fresh outlook on cable designs, and Mr. Tyler's paper illustrates the type of cable used on the Crewe-Manchester section.

Because of the impedance of the running rails at 50 cycles, most of the traction current leaves the rails and returns to the supply point via the earth. Telephone circuits using earth-connected signalling may therefore be affected at a considerable distance from the railway.

To reduce both electro-magnetic induction and flow of traction current to the earth, booster transformers have been provided at intervals in the traction system.

The purpose of these transformers is to cause the traction current to flow almost entirely in either the rails or in the return conductor, where this has been provided.

CIVIL ENGINEERING

Summary of a paper by Mr. M. G. R. Smith, Chief Civil Engineer, Western Region, British Railways

In a paper containing information contributed by the Chief Engineers of all Regions of British Railways, Mr. M. G. R. Smith, Chief Civil Engineer of the Western Region of British Railways, stated that the provision of capital for modernisation engendered a new outlook in engineering thinking and enabled techniques hitherto prohibited by lack of funds to be applied, To secure the greatest economical advantage, planning required a balance between the requirements of all railway departments. By the time user departments can present their demands matters become so urgent that speed in engineering works is essential and often outweighs cheaper and slower methods of construction.

Shortage of staff calls for increasingly-efficient administration and work-study as well as payment by results. Recruitment of suitable technical staff has been difficult, and a heavy burden has fallen on the few experienced designers and supervisory staff.

Continuous welded rails

The high economic value of continuous welded rails was early recognised as reducing maintenance and renewal costs provided other trackwork matches it. Concrete sleepers, new forms of fastenings, deeper ballast, and improved formation and drainage enable full value to be taken of the welded rail.

Other important improvements are flatter junctions and crossovers, allowing of up to 70 m.p.h. speeds, with manganese-steel crossings combining to improve the running.

The provision of additional tracks to increase line capacity is very costly, but modern signalling and improved motive power can often achieve all that is required. Most major track works, including flyover and burrowing junctions, are required to avoid conflicting traffic movements and provide fast through lines.

Many girder bridges are aged and all were starved of maintenance during two world wars. As well as intensive repairs and reconstruction, a large volume of bridgework is being undertaken to provide adequate clearance for electrification overhead wiring below overbridges. The methods employed to obtain this clearance include the lowering or slewing of tracks, raising bridge decks, reconstruction of arches and decks, and rebuilding of tunnels to new contours.

Sorting sidings seen from the hump at Margam marshalling yard, Port Talbot, Western Region, British Railways

Under steam traction, a bridge receives the full design load only occasionally when the phase of the hammer-blow and span resonance coincide, but full design load must be expected under the passage of every heavy diesel or electric locomotive at speed. Moreover, their smaller wheel diameters and axle spacings tend to make the level of stress greater.

New methods

Prestressed concrete under- and over-bridges are increasing rapidly, and in steel bridges shop- and site-riveting is being replaced by shop-welding and high-strength site-bolting.

Opportunity is taken in the course of electrification to include all expected works such as the provision of additional running facilities, improved connnections for fast and slow lines to give higher turn-out speeds, power signalling, lengthening of platforms, and reconstruction of station buildings. Co-ordination of such works with the annual maintenance programme within the time schedule set for completion of electrification is one of the most exacting tasks of the Chief Civil Engineer.

The principal requirements of diesel traction are depots for serving and maintaining locomotives and other stock. Their siting is governed by the need to reduce light-mileage and provide servicing between runs to secure high availability. In urban areas selection of sites is restricted by the limited space available.

For the modernisation of small stations, the prefabricated standardised building is economical and speedy in erection without interfering with traffic. The most usual roofing is of the verandah type with a minimum of supporting columns.

Ultra-modern marshalling yards

Numerous marshalling yards are being replaced by a few large ones which are among the most modern in Europe. Electronic control taking into consider-

Freight terminal at Spekeland Road, Liverpool, in the London Midland Region of British Railways

ation every relative condition automatically controls wagon speeds. The selection of site and design of layout, including critical gradients, are the main engineering considerations. Most freight terminals are equipped with slat-conveyors.

Research and development

Research and development are essential to ensure that, with true engineering economy, the large sums involved in modernisation equal money well spent. Permanent-way research in particular is invaluable in meeting the needs of faster traffic with safety and in securing track longevity. As road tests in service take time, accelerated laboratory testing is necessary to supplement stress measurements taken in the field. Track-recording vehicles are also of the first importance.

Ground failures, fatigue in materials, and corrosion are most difficult to forecast, but statistical analysis of failures, considered with experience of old conditions, is a valuable guide to research, providing economic and safe solutions to engineering problems. Digital computers are greatly helping in this research.

Among current studies are the relations between speed and nominal wheel-load, and the dynamic reaction between rail and baseplate. Considerable improvements in rail-to-sleeper fastenings have resulted. Moreover, stresses between ballast and soil are being investigated, and in consequence formation-grouting is being developed without any interference with traffic. Thanks to previous research, pressure-injection of aerated grout to stabilise slipping embankments and cuttings has been carried out in over 130 places.

International co-operation

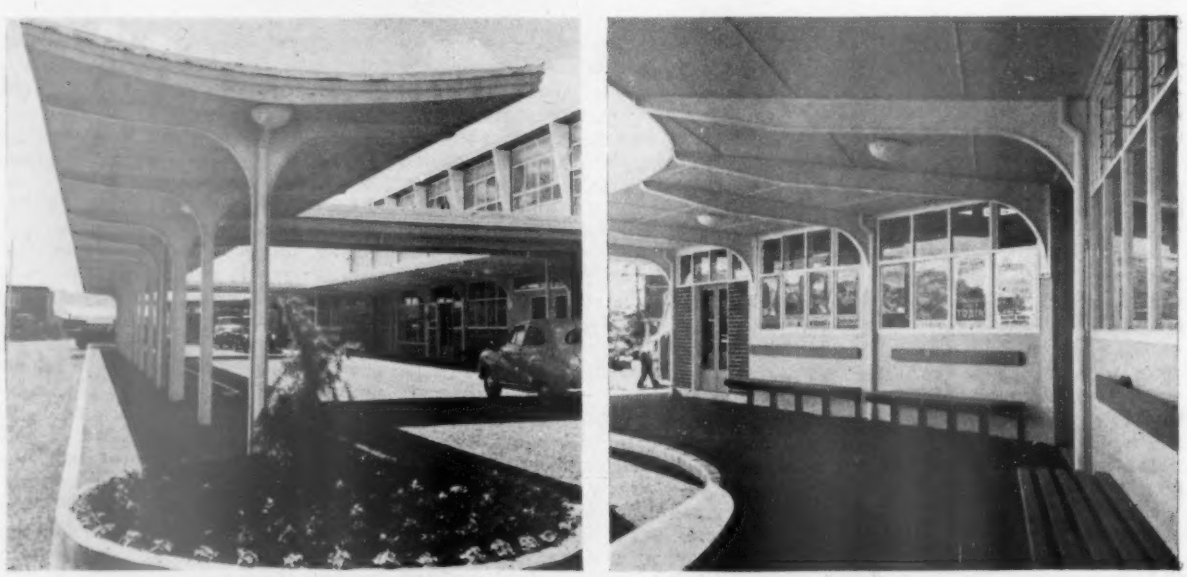
Liaison with Continental railway engineers is increasing and experience gained abroad has aided in the study of such equipment as concrete sleepers. Engineers of eight countries, including Britain, are co-operating in sleeper and other track-component testing.

In the U.K. experiments both under synthesised test conditions in a disused tunnel and in the open have given information—notably regarding destressing—about the laying and maintenance of continuous-welded track.

Mechanisation has produced considerable economies and with pre-assembled track has reduced the cost of re-laying by 25 per cent. Many and various types of permanent way and earth-moving machines and electric hand tools have proved their value.

For repairing brick tunnel lining, a system of mechanical pointing has been developed under which pressure jets project a series of pellets of quick-setting mortar into the joints; its use ensures faster working and better results.

NEW ZEALAND TRAVEL CENTRE



Two views of the new combined rail and road travel centre at Rotorua, New Zealand

ELECTRIC RAILWAY TRACTION SECTION

S.N.C.F. Electrification progress

THE attitude existing in certain British quarters in relation to railways and railway electrification in this country contrasts sharply with the enthusiastic confidence in the future of the French railway system in general, and in the 25-kV. single-phase system of electrification in particular, expressed in an article in the April number of "Transmondia." The author, nevertheless, admits that the conversion of the existing widespread 1,500 V. d.c. system would be economically impracticable in the foreseeable future and expects that extensive use will be made of the "bi-current" machine, the motive power unit capable of operating on both systems and, to a lesser extent, of machines equipped for four systems for international traffic.

On the French railway system, the policy is to concentrate long-distance passenger traffic into relatively few trains. This policy, which has resulted in the famous evening services, has certainly been successful, but passengers who need to travel at other times will use other forms of transport unless greater flexibility is introduced to the railway system. The fierce competition of present times is perhaps the price of economic liberty, but is scarcely profitable to the community if it results in neglect of the most economic form of transport in favour of more wasteful forms. On the electrified main lines in France the long-distance multiple-unit train is virtually non-existent and the problem of light-weight trains is a new one for electric traction. Will it be solved by the use of the multiple-unit train or of the locomotive-hauled lightweight train ?

So far as the latter is concerned, the S.N.C.F. is well equipped thanks to the 250 single-phase, Type BB 16500 locomotives and the 135 d.c. 1,500-V. Type BB 9400 locomotives now in course of delivery. These locomotives can haul trains of from 450 to 500 tons at 80 m.p.h. up gradients of 1-in-200 and are very suitable for a service of lightweight trains. They are also suited to the haulage of freight trains (the BB 16500 is provided with two gear ratios) which improves their operational availability and is likely to tip the scale in favour of the light-weight locomotive-hauled train.

The tendency in the design of the electric locomotive is toward a reduction in the number of motors so as to make use of the power potential of the very large motor. Progress with transmissions for electric locomotives is such that it is no longer advantageous to divide the total locomotive power among several motors, one to each axle. The single motor bogie is perhaps only a transitional stage toward the single-motor locomotive, which principle would make it much easier to design a four-axle single-phase locomotive of 7,000 h.p. than it would be today with the four-motor locomotive. Indeed, the locomotive without bogies, which is to the railway what the car with independent four-wheel drive is to the road, is already on the drawing board.

The Japanese are constructing a standard-gauge line between Tokyo and Osaka on which they will operate multiple-unit trains at 150 m.p.h. and high-speed freight trains at 100 m.p.h. In five years' time, they will lead the world for high-average train speeds and their exports of railway equipment must benefit accordingly. France, already holding the world record for the highest speed ever attained on a railway, must make a further effort to counter this competition.

"Transmondia" reviews the prospects for further electrification of main and subsidiary lines in France and does not hesitate to envisage the adoption of the 50-cycle single-phase system, even for lines remote from sections at present electrified on that system and separated from them by d.c. lines. It is expected that within three or four years the route from Marseilles to Ventimiglia will be electrified on the 25-kV. single-phase system. This will be facilitated by the decision of the Italian Railways to convert the line between Savona and Ventimiglia from single to double track and to replace the existing three-phase equipment by 25-kV. single-phase equipment so that Italian industry may obtain experience with this system which is regarded as incontrovertibly the system of the future.

Swiss electricity generation

THE management report of the Swiss Federal Railways for the last quarter of 1960 shows how much the railways have benefited from the heavy rainfall. On October 1, 1960, the contents of the reservoirs, including the railway share of that of the Etzel generating station, stood at 99 per cent capacity as against 79 per cent on the same day in 1959. On October 10, they were completely full, and after falling off slightly the contents again equalled capacity on November 7.

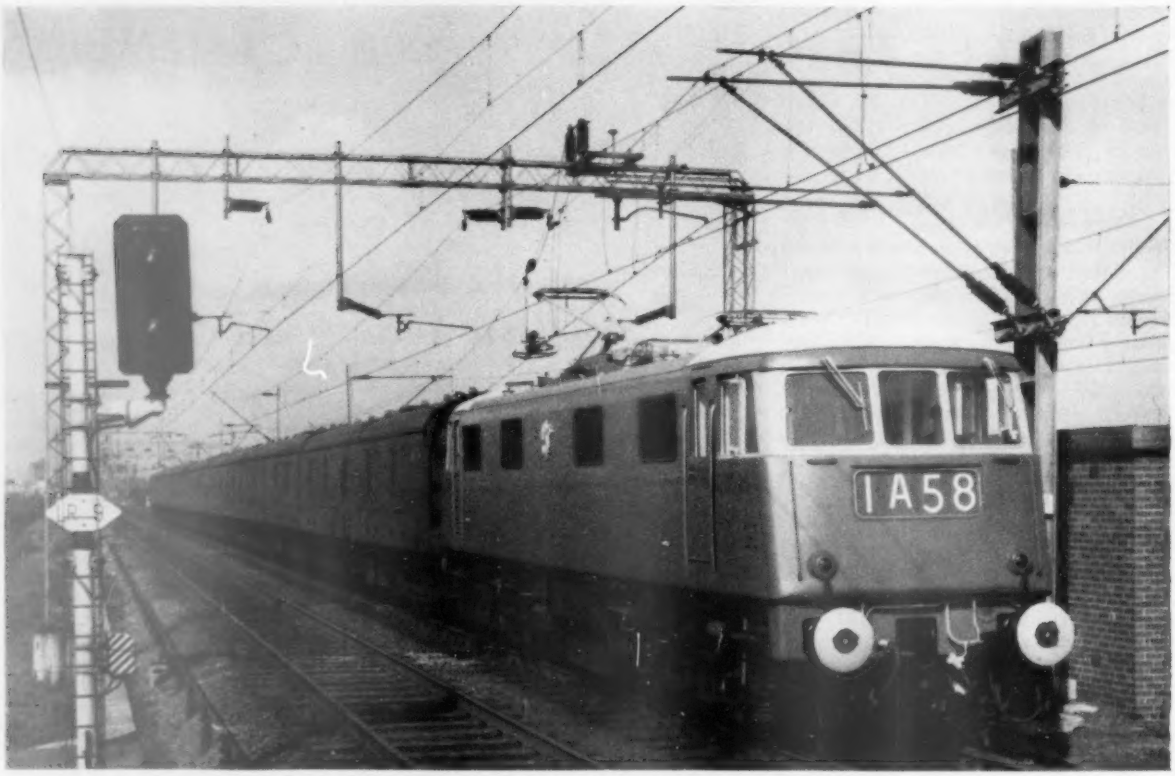
As a result of the heavy rainfall, the number of units of electricity generated exceeded that for the previous year by 42·5 per cent in the railway's generating stations and by 139·1 per cent in the jointly-owned generating stations. At the Etzel station it was possible to suspend completely the purchase of three-phase power for the pumping of water, which diminished the total of railway generation station consumption and transmission losses by 14·1 per cent.

The continuous import of power from the stand-by supply provided by the German Federal Railways over the two 66 kV. Muttenz-Haltingen lines was resumed on October 19, and amounted to nearly 17 million kWh. Thanks to the favourable storage situation, no recourse was had to the stand-by supply provided by the Atel-BKW-EDS-NOK consortium. Purchases of power from non-railway sources were reduced by 53·1 per cent. At Etzel, 898,300 cu. metres were stored by the single-phase pump, equivalent to the same number of kWh. On December 31, the contents of the storage reservoirs amounted to about 215 million kWh. or 76 per cent of maximum volume against 146 million kWh. (53 per cent) the previous year. Power consumption for the quarter for traction purposes was 289,357,000 kWh., practically the same as for the corresponding quarter of 1959, in spite of the increase in traffic; this is explained by a lower demand for train-heating purposes.

Tokyo Underground cars

DELIVERY began early this year of the 240 3-ft. 6-in. (1·067 mm.) gauge cars ordered by the Teito Rapid Transit Authority (Tokyo Underground Railway) from Kisha Seizo Kaisha and Tokyu Sharyo Kaisha. Carrying capacity is 52 seated and 88 standing. Overall dimensions are: length, 59 ft. (18,000 mm.), width, 9 ft. 2 in. (2,790 mm.), height, 11 ft. 10 in. (3,600 mm.). Empty, the weight is 32·5 tons (33 *tonnes*). The all-welded bogies, which have a wheelbase of 6 ft. 11 in. (2,100 mm.), and run on wheels of 2 ft. 10 in. (860 mm.) dia., are set at 39 ft. 4 in. (12,000 mm.) centres.

An unusual feature is the use of air suspension. Power supply is 1,500 V. d.c., the current being fed to four fully-sprung motors each of 100 h.p. Maximum speed is 62 m.p.h. (100 km.h.), and normal acceleration 2·5 m.hr.sec. (40 km.hr.sec.).



Train hauled by English Electric 25-kV. 50-cycle locomotive

Developments in the 50-cycle system of railway electrification

Advantages of low-voltage control and its application using transductors or controlled silicon rectifiers

By **H. B. CALVERLEY, B.Sc. (Eng.), M.I.E.E.**, *Assistant Chief Engineer (Development), Traction Department, English Electric Co. Ltd.*

and **G. W. GRAHAM, B.Sc. (Eng.)**, *Traction Development Department, English Electric Co. Ltd.*

As early as 1950, the English Electric Co. Ltd. was investigating the future of the 50-cycle traction system. The end of the initial development period in Britain can be considered as 1960, this being the year in which regular operation of 50-cycle traction services began between Manchester and Crewe in the London Midland Region.

The company's first major development in the field of rectifier traction for the 50-cycle system was on the Lancaster-Morecambe-Heysham line, where a regular service began in 1953 (see *The Railway Gazette* of October 9, 1953).

Many experiments were tried on these Lancaster-Morecambe-Heysham equipments (with rectifiers and d.c. motors) and much knowledge was gained. The company was the first manufacturer to produce multiple-unit equipments in bulk for the British Transport Commission, the first of which began regular service early in 1959 and are operating with great success.

Equally important was the development of equipments for locomotives. For these, the rectifier system was again chosen. The development of suitable rectifiers and circuits was put in hand several years ago, and culminated in the locomotives now operating on the Manchester-Crewe line.

Low-voltage control

One of the first important decisions was to develop the low-voltage control system for English Electric locomotives up to about 4,000 h.p. On this system, the main transformer on the locomotive has a tapped secondary winding, and an on-load tap-changer operating on this winding feeds directly the main rectifiers, which in turn feed the traction motors. The prevalence of high-voltage tap-changing on 50-cycle locomotives can be explained by looking back to prewar conditions. By then, a.c. traction was highly developed in continental Europe, but only on the $16\frac{2}{3}$- cycle system, which used a.c. commutator-type traction motors. These motors can be built for satisfactory commutation conditions only by the use of a large number of poles, which results in a motor of very high current rating at very low voltage. For a 3,000-h.p. locomotive, the traction-motor rated current might be as high as 2,000A. Thus, for four motors in parallel, an 8,000-A. tap-changer would be needed. Because of the difficulties of switching such heavy currents the high-voltage control system was developed.

The conditions are very different in rectifier locomotives. On the English Electric locomotives for British Railways, for example, the rated current per motor is about 700A., i.e., about one-third of that of $16\frac{2}{3}$-cycle locomotives. Tap-changing on currents of this magnitude is not at all difficult, and one of the outstanding advantages of l.v. when compared with h.v. control is that of economy in power demand.

As a basis for comparison it is reasonable to assume that, when on the tapping giving maximum output voltage, the designed percentage reactances of the

transformer equipment for the h.v. and l.v. control systems will be equal, being governed by considerations of fault currents. Thus, the locomotive performance, power factor, and efficiency will be the same on this tapping for the two types of control However, considering a case of tapping corresponding to a train speed of half that at the top tapping, the voltage regulation will be greater for h.v. control for two reasons: first, the percentage reactance will then be more than twice that for the l.v. scheme; and second, the transformer resistance loss will be nearly three times that for the l.v. scheme. Consequently, to achieve this particular train speed it would be necessary for the h.v. scheme to use a tapping corresponding to a higher no-load voltage. Therefore the line current would be greater for a given motor current. In other words, for the same input power to the motors, the h.v. control scheme has a lower efficiency and a lower power factor.

Dual overhead line voltages

The advantages of l.v. control are greatly increased on a railway with dual overhead line voltages, such as the British Railways 25-kV/6·25-kV. system. Low-voltage control allows the primary winding to comprise four sections which are connected in series for 25 kV. and in parallel for 6·25 kV.; therefore the locomotive performance and current consumption are the same for both voltages. With h.v. control the 6·25-kV. connection is made to a tapping approximately a quarter of the way from the earthed end of the tapped auto-transformer. Therefore, while running on the 6·25-kV. line there is, even on the top tapping, a double transformation (6·25 kV./25 kV. and 25 kV./l.v.), and the locomotive performance is bound to be inferior to that on the 25-kV. line because of the much higher values of reactance and copper loss.

Developments in rectifiers

It is probable that, after the next year or two, few locomotives will be built employing arc rectifiers; even now many traction equipments are being built using germanium or silicon rectifiers.

A multiple-unit train fitted with English Electric equipment incorporating silicon rectifiers was commissioned in June, 1960, on the Colchester-Clacton line. This train also has a novel scheme of control using a regulating transformer, made by Brentford Transformers Limited, which provides smooth control of motor voltage.

The company is also building 42 multiple-unit train equipments and a locomotive with silicon rectifiers. The locomotive control scheme uses transductors to effect smooth control of traction-motor voltage and almost to eliminate arcing at the tap-changer contacts. The saving in space inside the locomotive body, resulting from the use of silicon rectifiers and the transductor scheme, allows a 1,000-kW. rheostatic-braking resistor with its control equipment to be fitted to the 3,000-h.p. locomotive without significant increase in weight.

It is expected that, in the future, the transductors themselves will be replaced by silicon-controlled rectifiers. This will result in minimum weight of equipment because a simple transformer with secondary tappings is all that is required. (There are no auxiliary transformers or tap-change reactors.) Other advantages are maximum hauling capacity, because of the complete elimination of notching peaks, and the favourable speed/tractive-effort characteristics; maximum possible power factor and efficiency, on all the running positions (e.g. 15) of the master controller, and minimum maintenance of tap-changer, because of the elimination of arcing at the power contacts.

Developments under consideration, but not necessarily yet economically practicable, include the use of static frequency and phase converters which would allow multi - phase squirrel - cage induction motors to be used for propulsion.

Transductor control locomotives

Of the various methods of achieving the aims of notchless control and reduction of mechanical switchgear in rectifier traction equipment, one which has periodically attracted interest is that of the grid-controlled arc rectifier.

In the arrangement shown in Fig. 1a the same pair of rectifiers is used for each tap-change sequence, being connected to the appropriate tappings by selector switches which do not have to rupture load. In an increasing voltage sequence, with tap selector switches T_1 and T_2 closed, R_O fires free and R_E is progressively unblocked until the load voltage corresponds to T_2. R_O is then fully blocked, and T_1 may be opened on no current, and T_3 closed without affecting load voltage. The sequence is then repeated. It is noteworthy that reduction of voltage and downward tap-

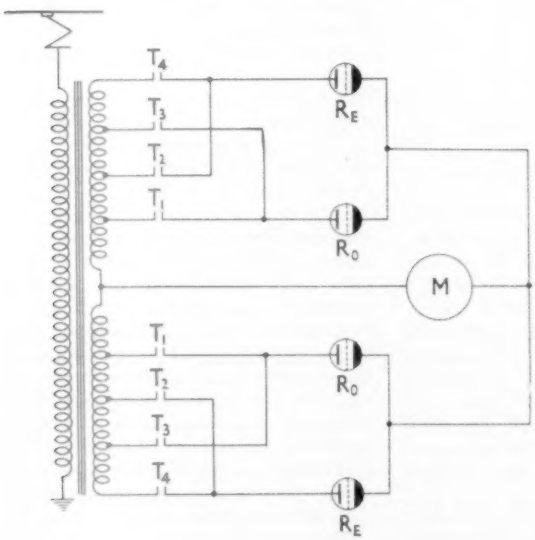


Fig. 1(a)—Tap-changing with grid-controller rectifiers

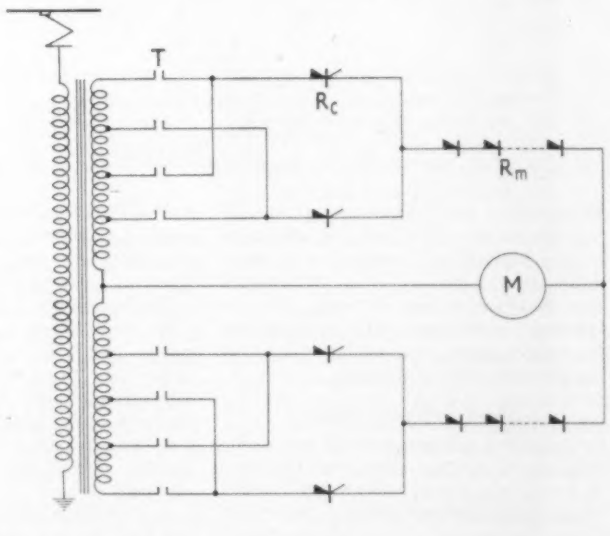


Fig. 1(b)—Application of semi-conductor rectifiers to circuit of Fig. 1(a)

KEY

T. Non-rupturing top-selector switches
R. Grid-controller arc rectifiers
M. Traction motor load circuit
Rc Controlled rectifiers
Rm Main rectifiers

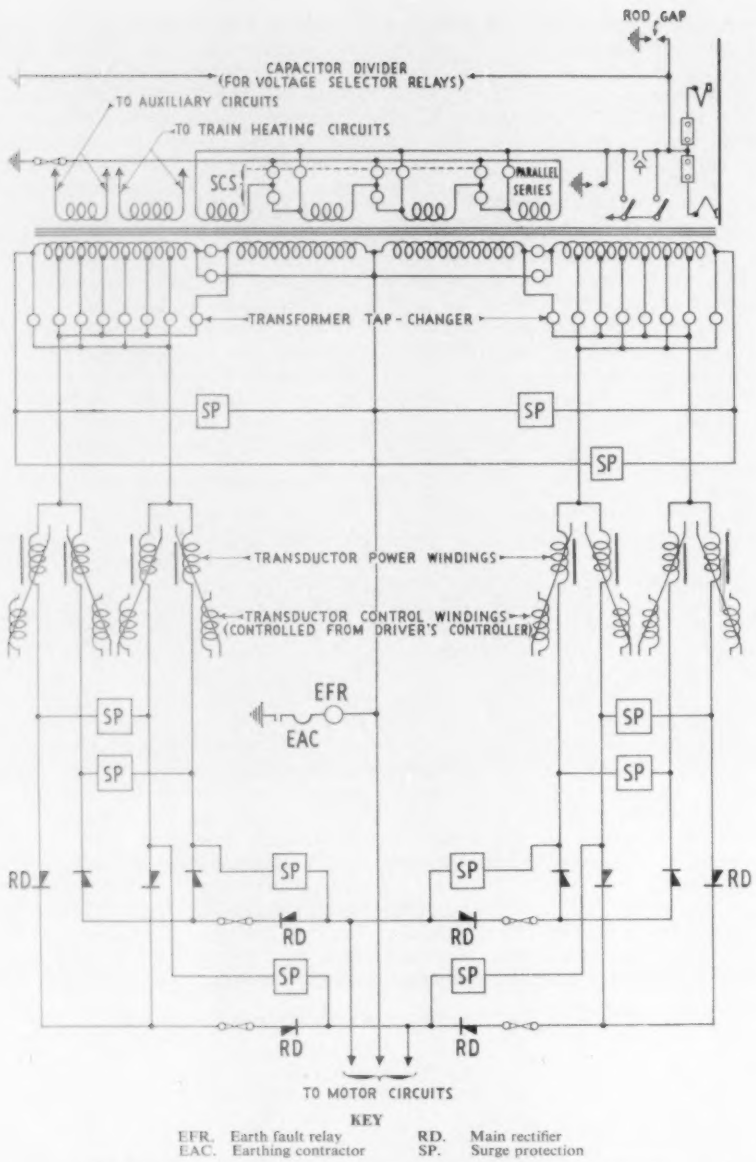


Fig. 2—Transductor control scheme for silicon-rectifier locomotive

changes are made by an exact reversal of the process. The rectifier connected to the higher tap is unblocked successively later in the half-cycle until it does not conduct at all. It may then be switched to the next-but-one tap lower, and completely unblocked before a further reduction of voltage.

Semiconductor rectifiers

Even this scheme involves twice the number of rectifiers needed for the basic a.c./d.c. conversion. The advent of the semiconductor rectifiers has rather modified the picture. The order of d.c. voltage established by optimum traction motor design requires the use of several cells in series, but, provided that the inverse voltage rating of a single cell is satisfactory for one inter-tap voltage, only the first cell in each rectifier string need be duplicated, and of the "gated," or controlled, type. Such an arrangement is illustrated in Fig. 1b, and control is effected exactly as described above.

At the moment, silicon-controlled diodes are not an economic proposition for this type of application. The circuit can be employed with other switching devices, and this article describes a particular application employing transductors as the switching elements.

In December, 1958, the English Electric Co. Ltd., put in hand a design study based on the requirements of a motor-coach equipment, but the opportunity arose, by agreement with the British Transport Commission, to equip with silicon rectifiers and transductor-assisted tap-changing one of the a.c. locomotives under construction for the Commission.

The first point to settle was the location of the transductors. The smooth control of load voltage which transductors can provide renders unnecessary the voltage-dropping reactors employed on the ignitron locomotives to assist notching. The inter-tap reactors are also no longer required. It was finally found possible to fit the transductor units into the reactor tank in the space thus vacated.

The use of transductors eliminates the need for a.c. load-rupturing switches, and the space which these large switches previously occupied has been used for a 1,000-kW. rheostatic braking resistance unit of the force-ventilated type. Power-operated roof shutters protect the resistor from the weather when not in use.

During rheostatic braking, the traction motor fields are all connected in series for excitation from the main transformer and rectifier, under transductor control.

As Fig. 2 shows, four transductors are used, each comprising two elements. They are of the auto-self-excited type. Each element has power windings rated at 1,000A. (half-wave) and low current d.c. control and bias windings. Each element can absorb the full inter-tap voltage at a line voltage of 27·5-kV. They are cooled by the main transformer oil circuit.

Control equipment

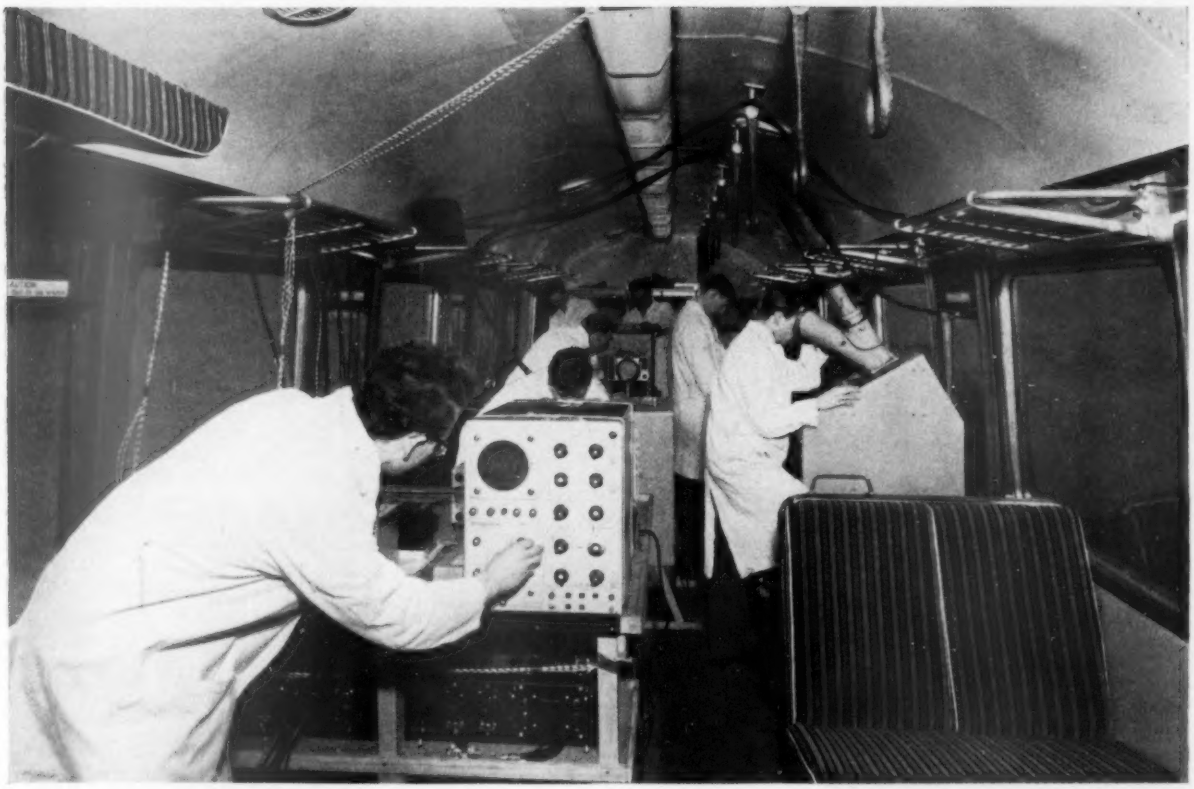
The existing tap selector camshaft has been retained and fitted with spark tips to deal with breaking the transductor magnetising current of about 10A during downward tap changes.

Transductor control is effected by a small electrically-driven camshaft with suitable interlocking to the tap selectors. This camshaft exercises sequence control over the control and bias current by means of small switched resistance steps. These circuits are supplied from the 110-V. battery.

The next step toward improved adhesive performance and reduction of moving parts is in hand. It consists in further modifying the equipment to eliminate the switched resistance transductor control, and fitting instead magnetic pre-amplifiers. These are to be arranged as a servo-system to afford control of traction motor current at any value selected by the driver up to any speed he wishes, within the equipment capacity. Together with over-riding wheel-slip correction control, this will enable the driver to make the best use of available adhesion, while maintaining the inherent stability of controlled voltage conditions for the traction motors.

This locomotive should be in operation on British Railways by about September, 1961.

The authors acknowledge permission received from English Electric Co. Ltd. to publish this material.



Interior of the mobile test laboratory described below

MOBILE TEST LABORATORY FOR 25-kV LINES on British Railways

Manufacturer makes practical investigation of troubles experienced with multiple-unit equipment

ALTHOUGH the new 25-kV. multiple-unit train equipments for suburban lines on the Eastern Region of British Railways ran perfectly satisfactorily for many thousands of miles when on test at 25 kV., certain troubles were encountered when the trains entered service, which included a substantial amount of running at 6·25 kV.

In February, 1961, it was announced that the General Electric Co., Ltd., after consultation with the British Transport Commission, had fitted out a three-car multiple-unit train as a mobile test laboratory to establish the working conditions of the high-voltage electrification on these lines. This unit, coupled to a standard three-car unit to make up a six-car train, has been running between Enfield Town and Chingford and, as a result of the testing carried out, a considerable amount of valuable information has been made available.

Results of investigation awaited

The difficulties encountered when the new trains first entered service in this region are still under investigation by Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport, whose interim report is awaited with interest. In the meantime, some details of the test equipment installed in the laboratory can be disclosed.

Twelve measuring points

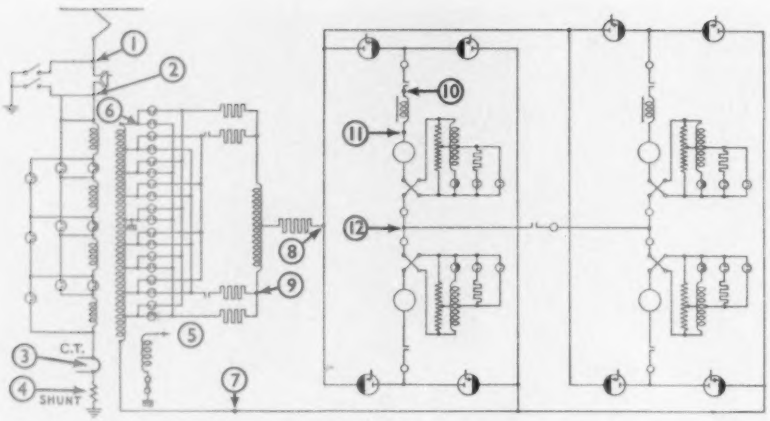
The equipment installed in the mobile laboratory is designed to provide a flexible measuring system at 12 vital points in the a.c. and d.c. power circuits of the train. These 12 points are each brought out through step-down voltage dividers to a main distribution panel. The voltage dividers are all of the capacitive type having a wide-band frequency response so that steep-fronted overvoltages can be accurately recorded. The distribution board permits one or more oscillographs to be connected simultaneously to one or more of the test points.

For the co-ordination of changes in the power circuits during a test sequence, a 12-channel electro-magnetic recorder is permanently connected to all test points through appropriate voltage dividers or, in the case of current measurements, wide-band a.c. coupled amplifiers. In this manner, an effective means of correlating simultaneous disturbances in the a.c. and d.c. circuits is achieved.

For the recording of steep-fronted short-duration voltages, two transient recorders are installed; these are supplemented by a further instrument which enables any fast transient down to a microsecond duration to be retained on the face of its cathode-ray tube for detailed examination for any required interval of time. In addition, several oscillographs, all with wide-band amplifiers and multi-range time bases, are installed.

Simplified switching

To simplify switching from one to another at any test point, all the voltage dividers have been designed to provide identical response characteristics when associated with any instrument. The diagram on the next page shows essential



Details of power circuits, showing the 12 *points at which measurements can be made*

details of the power circuits and the 12 points in the system at which measurements can be made. Four measuring points are on the 6·25-kV. side of the transformer, four on the secondary winding and tapping choke section, three on the d.c. circuit of one pair of motors in the bridge-connected rectifier system, and the twelfth is in the tertiary winding which supplies all the auxiliary loads.

All voltages are measured with respect to earth (the mid-point of the transformer secondary winding); the voltage dividers being designed to allow peak overvoltages of up to ten times the normal peak voltage appearing at the test points to be recorded on 35-mm. film.

Self-tripping oscillographs

Most of the oscillographs are self-tripping and are set initially to operate at all overvoltages exceeding twice normal, although simple means are provided to alter this value over a wide range. A common tripping circuit is also provided for the other instruments fed from one or other of the self-tripping oscillographs.

Check tests

Considerable check tests have been made to ensure complete screening of all the test leads and 70-ohm co-axial cable has been used throughout for this purpose. All the voltage dividers are installed as close as possible to the measuring point, in many cases in specially designed screened enclosures. The high-voltage capacitors of the dividers for measurement at 6·25 kV. are installed on the train roof, the remainder being mounted with the main power equipment under the train.

Comprehensive calibration tests have been carried out using a portable surge-generator giving a wide range of voltage waveshapes and injecting the surge at the high-voltage end of the capacitor-dividers. The tests were made with all the recording equipment connected in the various alternative arrangements to cross check that the divider characteristics were in no way affected by test circuit changes. Similar test checks were made using a separate power-frequency source and also with the train normally energised from the catenary at Chingford Station.

Complementary equipment

In addition to the provision of test gear for measuring overvoltages much complementary equipment is installed in the test train. A comprehensive instrument is provided which monitors the operation of the eight single-anode rectifiers and records backfires, re-ignitions, and other phenomena associated with their operation.

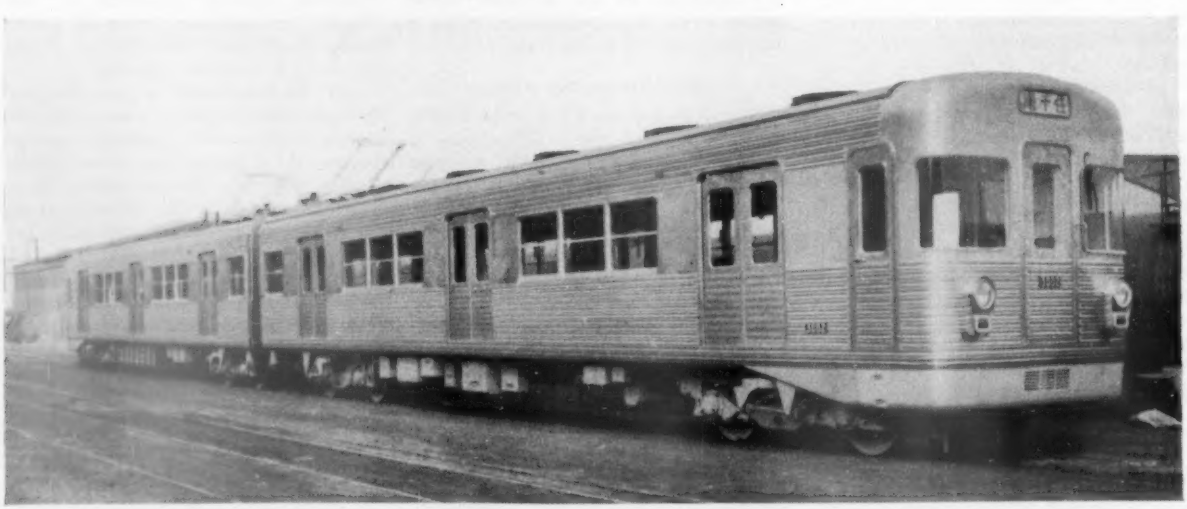
A point-on-wave synchroniser is fed from the tertiary winding to permit the high-voltage air-blast circuit breaker to be opened at any point on the power-frequency wave. This is arranged to operate the breaker trip-coil directly or through a transistorised tap-position indicator. The latter equipment permits the step position of the automatic secondary-tap-changer to be recorded visually or on the multi-channel pen recorder and the breaker to be operated on any tap position.

The condition of line circuit breakers and other circuits is shown by lamp indicators and a comprehensive intercommunication system has been installed to link the driver's cabin, power supplies operator, test coach personnel, and test leader. Tape-recording facilities have been provided.

AFRICAN TOUR

Mr. J. G. Orr, Secretary of the Engineers' Guild returned on May 1 from a month's tour of Nigeria, Kenya, Uganda, and Tanganyika.

TOKYO UNDERGROUND CARS



New 3*-ft.* 6*-in. gauge cars ordered by the Tokyo Underground Railway* (*editorial on page* 509 *refers*)

PERSONAL

London Transport Executive

MR. J. B. BURNELL, C.B.E., J.P., M.INST.T., Operating Manager (Central Road Services), London Transport Executive, who is to retire, was born in 1898 and entered the Royal Navy in 1911. He served with the Grand Fleet and in the Submarine Service during the 1914-18 war and retired from the Navy with the rank of Lt.-Commander in 1925. In 1926 he joined the London General Omnibus Company as a Traffic Observer and, in 1931, became a Depot Superintendent. After serving as Staff Assistant in the London Transport Country Bus & Coach Department and as Assistant Staff Superintendent for all

Mr. J. B. Burnell

road services he became Divisional Superintendent (Eastern Division) in 1940. He was made Operating Manager (Central Buses) in 1945 and Operating Manager (Central Road Services) in 1948.

MR. F. J. LLOYD, B.SC., F.I.A., Divisional Superintendent, Southern Division (Central Road Services), London Transport Executive, who, has been appointed Operating Manager, Central Road Services, was educated at Ackworth School, York, and Liverpool University, where he obtained the degree of B.Sc. in mathematics. In 1947 he became a Fellow of the Institute of Actuaries. Mr. Lloyd joined London Transport in 1947 and was made Principal Executive Assistant to the Staff Administration Officer in 1949, becoming an Officer of the Executive three years later. In 1955 he transferred to the Department of the Operating Manager (Central Road Services) and in 1956, was appointed Assistant Divisional Superintendent in the North East Division, and in 1957 became Divisional Superintendent South West Division. Mr. Lloyd became Divisional Superintendent, Southern Division following a re-organisation last year.

Mr. F. J. Lloyd

British Railways

MR. H. KENDALL, Head of the Development & Special Traffic Section, District Passenger Superintendent's Office, Leeds, British Railways, North Eastern Region, has been appointed Assistant District Passenger Manager, Liverpool, London Midland Region.

The London Midland Region of British Railways has announced the following appointments: MR. C. D. CLEAVER to be Goods Agent, Coventry; MR. P. DANIEL to be Goods Agent, Warrington (Bank Quay & Central), and MR. W. S. TAIT to be Goods Agent, Manchester, Liverpool Road.

MR. J. J. SOUTHERN, Stationmaster, Wingate, British Railways, North Eastern Region, will also be in charge of Castle Eden, Trimden, Hesleden Public Delivery Siding, and Thornley Colliery Public Delivery Siding, from May 1.

MR. G. M. WATERS, Stationmaster, Amble, British Railways, North Eastern Region, has been appointed Stationmaster, Annitsford, also in charge of Cramlington, Stannington Public Delivery Siding and Plessey Public Delivery Siding.

MR. H. T. BIRD, District Engineer, Doncaster, British Railways, Eastern Region, has retired. MR. H. EAGERS, District Engineer, Perth, Scottish Region, has been appointed as his successor.

MR. C. J. NORTH, District Motive Power Superintendent, Kentish Town, British Railways, London Midland Region, who, as recorded in our April 28 issue, is to retire, began his railway career on the former Midland Railway in 1913 at Saltley, where he commenced mechanical training in the Chief Mechanical Engineer's shops. After serving with the 16th Battalion of the Lancaster Fusiliers in the 1914-18 war, he returned to Tyseley on the former Great Western Railway, where he gained further experience. In 1926 Mr. North returned to Saltley, then absorbed in the L.M.S. organisation, and, two years later, became Running Shed Foreman at Lancaster (Green Ayre). In 1931 he beame Foreman Fitter at Edge Hill, Liverpool, and held this position for nine years until, in 1940, he was appointed Head Office Mechanical Inspector, Divisional Office, Crewe. Four years later Mr. North became Assistant District Motive

Mr. C. J. North

Power Superintendent, Swansea (Victoria), and, in 1946, he acted as Assistant District Motive Power Superintendent, Camden, Later in the same year he was appointed Assistant District Motive Power Superintendent, Willesden. He became District Motive Power Superintendent, Kentish Town in 1954.

MR. H. J. T. PAIGE, Assistant Estate & Rating Surveyor (Scotland), British Transport Commission, who has retired, entered the service of the former Midland Railway in 1912, in the Land Agent's Office, Derby. During the 1914-18 war he served with H.M. Forces in France and Belgium, returning to Derby upon demobilisation in 1919. He was transferred to London in 1923, as draughtsman in the L.M.S. London Divisional Estate Agent's Office where, in 1927, he became Surveyor and, in 1929, Assistant District Estate Agent. In 1930, he was appointed to the Northern Divisional Office, Glasgow, as Surveyor (Development), becoming Assistant Divisional Estate Agent in 1932, and Assistant Divisional Estate and Rating Agent in 1947. Following nationalisation, Mr. Paige was appointed District Estate Surveyor (North), British Railways,

Mr. H. J. T. Paige

Scottish Region, in 1951, and Assistant Estate & Rating Surveyor (Scotland), British Transport Commission in 1956.

British Transport Commission

MR. L. C. JOHNSON, Archivist, British Transport Commission, has retired.

Institution of Railway Signal Engineers

MR. F. G. HATHAWAY, Senior Signal Engineer, Westinghouse Brake and Signal Co. Ltd., who, as recorded in our April 24 issue, was elected President of the Institution of Railway Signal Engineers, was born in 1907, educated at Blundell's School, Tiverton, and joined the Westinghouse Brake and Signal Company in 1924. He served a five year apprenticeship at the Chippenham factory, and afterwards gained outdoor construction experience on the first major colour-light signalling installation in England which embraced Manchester Victoria, Exchange, and Deal Street stations in 1929, and signalling modifications at Glasgow Central in 1930. In the same year he joined the Signal Department of the company at the head office in London. In 1933 Mr. Hathaway went to Warsaw for his company to assist in their contract for the installation of the first colour-light signalling on the Polish State Railways. From 1946 onwards he has undertaken numerous journeys to the Middle East, Spain, and the principal countries of the continent of Africa, in connection with the signalling activities of his company in those territories. Mr. Hathaway was appointed Senior Signal Engineer, in 1951, and in 1955 he assumed additional responsibilities for the company's contracts in connection with the supply and installation of their equipment for Mine Car Handling and Mine Traffic Control by his appointment as Chief Colliery Engineer. In July last year Mr. Hathaway went to Pakistan as the railway signalling member of the United Kingdom Railway Advisory Service Mission, which was undertaking a survey of the possibility of electrification on certain sections of the Pakistan Railways. He was elected a Student Member of the Institution in 1930, Associate Member in 1935, Member in 1939, and has been a Member of Council since 1952, having served on four of the Institution's Executive Committees.

Mr. F. G. Hathaway

Overseas

MR. N. F. STEVENS, Assistant Chief Mechanical Engineer (Workshops), East African Railways & Harbours, has retired.

LT.-COL. H. B. EVERARD is to retire as a member of the board of Rhodesia Railways on June 30. His place will be taken by MR. A. R. KEMP, a businessman from Broken Hill.

Industrial

MR. R. C. JENNINGS has been appointed Technical Manager, Chipman Chemical Co. Ltd.

MR. S. PARNELL has been appointed Deputy to the Chief Engineer of the Hollman Bros. Ltd. Group.

MR. F. B. COOMBES, Chief Designer of compressors, hoists, and pneumatic tools, Holman Bros. Ltd., has been appointed General Manager, Maram Power Limited, a subsidiary company.

MR. D. W. TAYLOR, Manager, Birmingham Sales Office, Alcan Industries Limited, is to take over management of the London Area Sales Office. MR. C. J. BUCHANAN-DUNLOP, Assistant Manager, Birmingham, has been appointed to succeed Mr. Taylor.

MR. D. S. WOODLEY, Chairman & Managing Director, Keith Blackman Limited is to retire from the position of Managing Director on May 31. He will remain as Chairman & Consultant to the company. MR. F. W. GOODGE, Joint Assistant Managing Director has been appointed to succeed as Managing Director and MR. C. J. ATKINS will become Assistant Managing Director.

MR. C. H. HAYTER, Works Manager, Templeborough, Steel Peech & Tozer has been appointed Works Manager, Ickles Departments & Bar Mills. MR. R. SCHOLEY, Works Manager, Ickles, is to be Works Manager (Flat Products); MR. R. S. HOWES, Manager, Spear Products, is to be Works Manager (Steelmaking & Primary Mills); MR. P. BEYNON, Works Manager (Operational Research & Work Study) is to be Personnel Manager; DR. B. B. HUNDY, Chief Research Metallurgist, is to be Chief Metallurgist; MR. W. ASH, Chief Works Metallurgist, is to be Deputy Chief Metallurgist; MR. H. A. LONGDEN, Assistant Chief Works Metallurgist, is to be Works Metallurgist, and MR. M. THOMAS, Works Manager (Services), will become General Services Manager.

Transport Tribunal

The Lord Chancellor has nominated MR. JOHN RHYS COLLWYN SAMUEL-GIBBON to be a Member of the Special Panel of the Transport Tribunal in succession to MR. N. L. C. MACASKIL, Q.C.

Public Transport Association

MR. A. F. R. CARLING, Chairman of the Public Transport Association will preside over the association's annual conference which opens at Eastbourne on May 16.

Obituary

We regret to record the recent death, at the age of 75, of MR. J. E. CALVERLEY, a Member of the Institution of Electrical Engineers and of the Institution of Locomotive Engineers.

We regret to record the death, on April 22, at the age of 87, of MR. E. H. DANNATT formerly Superintendent, Plymouth Division, Great Western Railway. Mr. Dannatt commenced his railway career with the North Eastern Railway at Darlington, in 1893. Subsequently he joined the Cambrian Railways as Assistant to the Superintendent of the Line. In 1906 he was appointed Commercial Assistant to the General Manager. He joined the Taff Vale Railway in 1910 and was appointed Superintendent of the Line in 1917. Following grouping he was appointed Superintendent of the Cardiff Valleys Division of the Great Western Railway in 1922 and became Superintendent of the Plymouth Division in 1924. Mr. Dannatt retired in 1932.

Erratum

In the biography of MR. A. R. PEPPER which appeared in our issue of April 21, we inadvertently described one of his previous appointments as "Shipping & Continental Manager, Victoria, Southern Region." This should have read Modernisation Assistant to the Shipping & Continental Manager, Victoria, Southern Region.

NEW EQUIPMENT *and Processes*

WEED KILLING TRAIN

In our issue of September 11, 1959, we described a weed-killing train built by the Chipman Chemical Co. Ltd. This train, known as their No. 3 train, proved itself capable of effectively spraying up to some 70 miles of track without any replenishment being required. The train has since covered many miles in the Midland, Southern, and Western Regions, and has performed excellent work.

Important developments

Since it was placed in service important developments have been made by the Company in the technique of spraying. Should it be required, different chemical mixtures can now be applied simultaneously. Differential spraying may be briefly defined as varying the amount of chemical deposited on a given area. Dispensable powders are those which are not soluble in water but are mixed in it and deposited by it. They remain to act by root uptake.

Weed growth is most extensive in the cess and it is in this area that most chemical is required. Hitherto, such extra treatment could be conveyed only by increasing the amount of spray and hence the amount of water. Water has always had to be paid for and now there is the question of availability, for with the withdrawal of steam locomotives some sources of water are no longer available.

Make-up of train

The train, it will be recalled, consists of a machine van, a mess and living van, and four tank wagons. The machine van houses a diesel engine, pumps, mixing and storage tanks, and carries the spraying nozzles. The mess and living van has accommodation for up to eight people, although the normal crew is three. Three of the tank wagons carry water, the fourth carrying concentrate chemical. When using slurry this is drawn to a mixing tank where powder is added. After mixing it is transferred to a storage tank, whence it is drawn by the metering pumps. Both the mixing and storage tanks are mechanically agitated.

Power supply

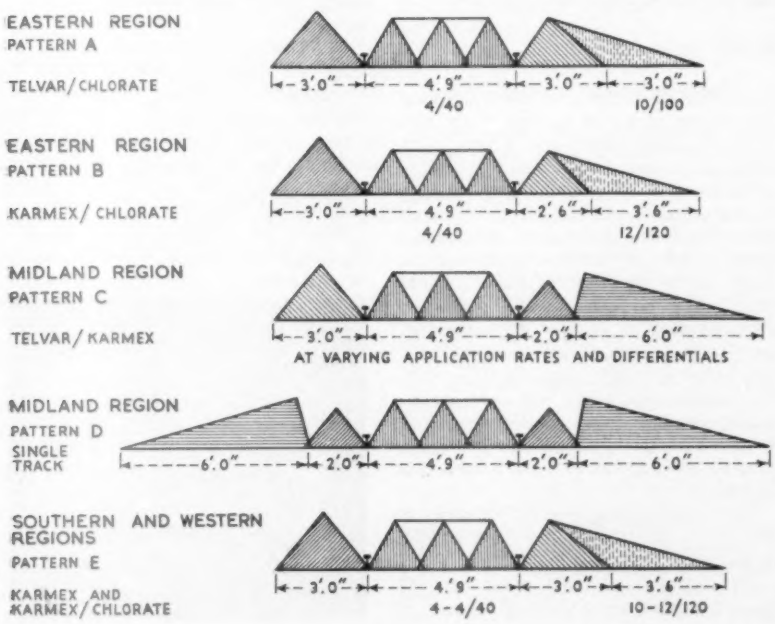
Power is supplied by the diesel engine, which also operates the pumps for the main water supply to the nozzles and for transfer from tank to tank. In addition it can be used to drive the metering pumps, for purposes of flushing or testing, and can also drive a Rootes

blower, should pneumatic agitation of the tank wagons be required.

The metering pumps, three in number, deliver slurry into the water supply to the nozzles. They are axle-driven, thus providing a feed proportional to the train speed. Spraying is normally carried out at 20 m.p.h., but it is possible to spray effectively at over twice that speed. The pumps have an infinitely-variable stroke, enabling any differential from 1 to 20 to be applied. The quantity of chemical fed into the water stream is under close control and can be varied to each nozzle as needed.

Special nozzles

One of the features of this system is that the water is supplied through the spray nozzles at a rate of 65 gallons an acre at 20 m.p.h., but as the rate of slurry being metered increases the volume



of water decreases, so that at the maximum design speed of 50 m.p.h. very little water is being used, the excess water being returned to the suction feed of the water pump through a sensitive relief valve. In the same way with this system differentials are applied without the use of large and wasteful quantities of water or solution. The placing of the differential dosage is managed by narrow "Angle Swath" nozzles specially designed to evenly apply solution over the cess or outer portions of the track. The use of these new nozzles enables the outrigger swinging booms, which were originally used, to be dispensed with. This is an important development as it adds both to safety and ease of operation.

The spraying patterns which will be applied in the regions concerned during 1961, with particular combinations of chemicals, are shown in the drawing. The pattern to be applied in the Scottish Region is similar to that shown for the Eastern Region. Vertical and horizontal hatching has been used to denote the high-dosage differential areas. In the case of single track the cess treatment is repeated. On double-line tracks half the six-foot way is sprayed at one pass. Where rates are shown on the drawing, e.g., 4/40, this denotes a slurry of 4 lb. powder plus 40 lb. chlorate.

As a result of these developments it is now possible for the train to normally cover over 100 miles at one fill. In addition, the chemical is deposited in exactly the quantity required in the area desired.

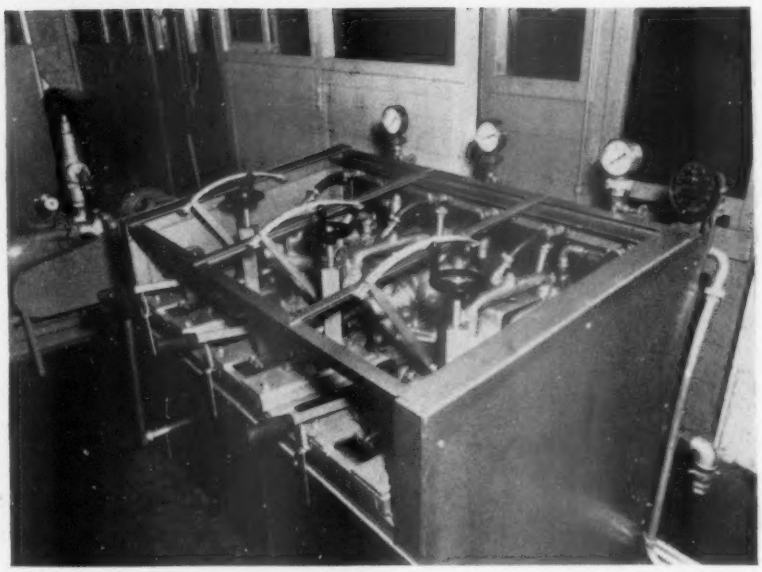
Acknowledgment

The photographs in this article are reproduced by kind permission of Mr. A. H. Cantrell, Chief Civil Engineer, Southern Region, British Railways.

NOZZLE CLEANER

The Hartridge nozzle cleaner combines the processes of oil and air cleaning in one operation.

The machine is compact and operates from an air supply at 50-80 lb. per sq. in. Adaptors are available to suit all standard nozzles. Operation is simple, the nozzle being placed on the vertical adaptor so that the spray holes are visible, the transparent domed-cover is then closed, when a control lever brings into operation clamping fingers which hold the nozzle securely during the cleaning process.



Continued depression of the lever first releases high-pressure air then oil. Repeated movements of the lever force cleaning oil through the nozzle spray holes, down the guide bore and feed holes, then across the face of the nozzle body. The cleansing process, finishes with a blast of air, thus removing oil and completely drying out the nozzle for its final inspection and assembly.

Full particulars may be obtained on application to Leslie Hartridge Limited, 151 Great Portland Street, London, W.1.

JOINT SEALANT

Secoseal elastomeric sealant is designed for sealing joints in curtain walls and other building structures where such joints are subject to considerable expansion caused by temperature changes.

Its properties of adhesion and extensibility enable the material to be used on joints which are liable to expand by as much as 50 per cent of their original width, and in joints which will not accommodate a depth of sealant of more than ¼ in. When the sealant is set, it has a tough, highly flexible, rubbery consistency which will resist mechanical damage and weather erosion. It also withstands petrol, oil, and most organic solvents as well as weak acids and alkalis.

The tensile strength of the material is 150 lb. sq. in. at 67 deg. F., the service temperature range is from −65 deg. F. to +250 deg. F., and a life of at least 30 years is expected as the result of tests.

Further details may be obtained from Secomastic Limited, Western Road, Bracknell, Berks.

GREASES

Bardall Products Limited announce two new greases. Their "No-Melt" grease is intended for use at high temperatures and is said to be capable of staying on bearings at temperatures up to 1,000 deg. F. (538 deg. C.).

The calcium - based water - repellent grease is for low-temperature work, where moisture or water has proved excessive for ordinary grease.

Further details are available from the maker, 39 Craven Road, London, W.2.

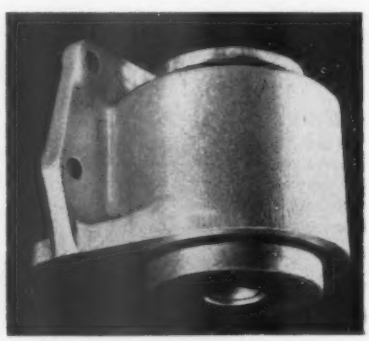
RESILIENT MOUNTING

The latest addition to the Silentbloc range is a simple four-bolt fitting.

Originally produced for resiliently securing large-capacity tanks on the chassis of road vehicles, this new resilient mounting has many possible applications.

Vertical deflection is 3/16in. at a maximum load of 5,000 lb.

Details are available from Silentbloc Limited, Manor Royal, Crawley, Sussex.



U.I.C. IN LONDON

Passenger traffic report considered

A special meeting of the 1st and 4th committees of U.I.C. was held in London on April 10 and 11 under the chairmanship of Mr. M. Cirillo, Deputy General Manager of the Italian State Railways, Chairman of the 4th Committee (Operating), supported by Mr. G. M. Leach, International Traffic Officer, British Transport Commission, Chairman of the 1st Committee (Passenger Traffic), to examine the reports covering the various aspects of the general problem concerning the future of passenger traffic, which were drafted by the study bodies specially appointed for this purpose.

Approximately 40 senior officials representing 13 railway administrations took part in the meeting.

In 1959 the attention of the U.I.C. Board of Management was drawn to the downward trend in passenger traffic recorded on certain networks, and the board decided that an extensive inquiry should be undertaken. The Board of Management considered that it would be useful to bring up to date the study made in 1952 on the prospects of passenger traffic. This study led to a number of concrete decisions such as the reduction in the number of classes of carriages, the setting up of the Trans-European-Express organisation, and the development of sleeping accommodation.

A study group was appointed under the chairmanship of M. Mermier, General Manager of the South Eastern region of the S.N.C.F., to draw up an introductory report concerning the future of passenger traffic. The report was examined during the meetings of the 1st and 4th Committees at Stuttgart in May, 1960. This document put forward various proposals concerning, more especially, timetables and the formation of international trains, the crossing of frontiers, increased sleeping accommodation, car-sleeper trains, Trans-Europ-Express services, seat reservations, publicity, the training of staff and relations with the travel agencies.

Working parties set up

To further the studies on certain problems raised in the report, it was decided to set up a number of Working Parties to study the measures to be taken concerning international passenger trains, modernisation of seat reservation systems, and far-reaching measures concerning international tariffs and commercial departments, relations with the travel agencies, measures to be taken with the object of facilitating travel by rail and study of special rolling stock to be use for car-sleeper trains.

The London meeting was held to discuss the reports dealing with the above questions.

The meeting first looked into the measures concerning international trains, embracing principally the definition of a "European" type of carriage, use of carriages in international services, the possible setting up of carriage pools and the staffing of international trains. To achieve homogeneity in the appearance of international trains the joint meeting was of the opinion that it would be desirable eventually to arrive at a European type of carriage, but it noted that the adoption of this formula was faced with a difficulty arising from the divergence of opinion existing between the administrations which had either adopted the 2nd class compartment with six seats, or those which had retained the eight-seat compartment.

After an exchange of views on the measures to be taken in order to facilitate travel by rail, the joint meeting adopted the text of a new leaflet. This contains various chapters dealing principally with the selection of staff, its training and instruction, time-table leaflets to be at the disposal of passengers in important international trains, passenger refreshment facilities, station signs, and indicators.

Conventional station signs

The meeting also looked into the question of special conventional signs at stations showing where such essential services as left luggage offices, enquiry offices, exchange offices, and post offices, were to be found.

On car-sleeper trains, which are continually proving more popular with the public, an exchange of views took place concerning the specialised rolling stock which was particularly suited to these services and the meeting considered that the time had come to draw up a comparison between the various types of rolling stock, to provide information for those administrations interested.

The meeting also took note of the studies carried out in connection with the modernisation of seat reservation systems and the far - reaching measures concerning international tariffs and commercial departments.

The conclusions of these discussions will be brought to the notice of the U.I.C. Board of Management which attaches particular importance to the future of passenger traffic. This body will be called on to give directives in connection with the various measures envisaged to provide the public with the services and facilities which the railways are desirous of providing.

Hydraulic extrusion press

A fully-mechanised metal-extrusion plant, claimed to be the most up to date in the country, is now in operation at the Froghall, Stoke-on-Trent, works of Thomas Bolton & Sons Ltd. The large gathering of guests at the opening ceremony, which was performed last week by Sir William McFadzean, Chairman of British Insulated Callender's Cables Limited, included civic dignitaries, representatives from private and nationalised industries, and trade union officials.

Founded in 1783, Thomas Bolton & Sons Ltd. are leading suppliers of copper products to steam locomotive builders for home and overseas railways. The plant now installed is to meet the rapidly increasing demand for extruded sections for electrical machinery, a large proportion of which is for diesel-electric and electric traction. Designed and built by the Loewy Engineering Co. Ltd., Bournemouth, the plant comprises a 1,700-ton oil-hydraulic extrusion press, three Loewy magnethermic mains-frequency induction heaters, and completely mechanised gear for the supply of billets to the press and for removal of the extruded product. All operations are push-button controlled by an operator seated at a console-type desk. A rotating die-holder enables dies for alternative sections to be fitted without stopping production.

Straight lengths are ejected from the press on to a cooling conveyor, and coiled strip, or rod, is automatically coiled as it leaves the press.

Staff & Labour Matters

Railway Salaried and Conciliation Staff

Following a meeting of its executive committee on April 30, the Transport Salaried Staffs' Association announced its rejection of the British Transport Commission's offer to reduce the standard working week of railway salaried staff from 42 to 40 hr. It has asked for its claim to be referred to the Railway Staff National Tribunal.

The claim of the T.S.S.A. is for a 38-hr. week for all salaried staff—a reduction of 4 hr. on the present week. Many clerical staff already work no more than 38 hr. and the T.S.S.A. feels that all salaried staff should have the same hours, irrespective of whether employed at depots, stations, district or head offices.

London Midland Region gives faster summer service

The steady progress made in the engineering work necessary in connection with the electrification of the main line between Euston and Manchester, Liverpool and Birmingham, on the London Midland Region of British Railways, is reflected in the timings of the trains for the summer period commencing on June 12.

Main-line trains between Euston and Crewe will be speeded up by 12 min. because some of the speed restrictions, which were applied to allow engineering work to be carried on whilst the ordinary train service was maintained, are being removed.

A faster and more frequent electric service will be introduced on the electrified lines between Manchester and Crewe, where at present electric trains are running in the former steam train timings. The electric multiple-unit suburban services into and out of Manchester during the peak residential periods will be considerably augmented.

The progress of the work at Piccadilly station in Manchester has allowed those services which were diverted to Manchester Exchange Victoria and Central stations last summer to revert to their normal routes to and from Manchester Piccadilly.

Seven more diesel four-car sets will be introduced between Marylebone and High Wycombe. One diesel set has been running on this line since January this year. A regular hourly interval service of diesel trains will be introduced between Chester and Birkenhead, Helsby and Birkenhead and Stockport and Stalybridge. A two-hourly service will also be introduced between Chester and Liverpool.

Buffet car services on the trains this summer will be more plentiful and 38 trains will convey these vehicles, compared with 12 last year.

Questions in Parliament

Victoria line tube project

Mr. Eric Fletcher (East Islington—Lab.) asked the Minister of Transport on April 19 whether he would now announce when a commencement would be made with the construction of a new tube from Victoria to North-East London.

Mr. Ernest Marples told him that he was not yet in a position to make any announcement on the subject, but would do so as soon as he could.

Mr. Fletcher said that the continuous procrastination would not do.

Mr. G. R. Strauss (Vauxhall—Lab.) asked how many years had the Minister's Department been considering this very urgent problem. How many different excuses had been put forward by different Ministers of Transport for not coming to a decision? Was not the continual failure to come to a decision an almost incredible example of Government delay, and could the Minister give any hope whatever that the Government were likely to be able to make a statement on the matter during the next few weeks or even few months?

Mr. Marples said it was obvious, with the railways in their present state, that the new Chairman of the British Transport Commission would have to make his assessment of the situation on the railways as a whole. The Victoria line would be considered in that context.

Mail security on trains

Mr. Daniel Jones (Burnley—Lab.) asked the Minister of Transport if he would give a general direction to the British Transport Commission to ensure greater security for mail on all their trains.

Mr. Ernest Marples explained that the British Transport Commission was co-operating fully with the Post Office in measures for the security of mails on trains.

Mr. D. Jones then asked the Postmaster-General what proposals concerning security of mail on trains were agreed during the recent discussions between his department, the Ministry of Transport, and the British Transport Commission.

Commander Kerans (The Hartlepools—Con.) also asked the Postmaster-General what steps he had taken recently to improve mail security in trains.

Mr. J. R. Bevins, replying to both questions, said that it would help the criminal world if he gave details of the steps that had been taken in co-operation with the Minister of Transport and the British Transport Commission to improve mail security on trains. He said that they included changes in the stowage arrangements for mails on long distance trains, and improved physical protection for the doors of guards' vans and the grilles of cages used for carrying mail.

Railway advertising policy

Mr. H. P. Gourlay (Kirkcaldy—Lab.) asked the Minister of Transport what changes in the general policy of the British Transport Commission regarding advertising were contemplated in view of his reorganisation proposals for the nationalised transport undertakings.

Mr. Marples said that general policy regarding advertising was a matter for the British Transport Commission and its successor undertakings. It was for them to decide whether any changes were necessary.

Fencing of electrified lines

Mr. J. J. Wells (Maidstone—Con.) asked the Minister of Transport if, in view of recent accidents on electrified railway lines, he would introduce legislation to alter the statutory specification of railway fencing.

Mr. Percy Wells (Faversham—Lab.) also asked the Minister if, in the interests of saving the lives of children and livestock, he would introduce legislation to enforce the provision of protective fencing where electrified railways pass through agricultural holdings.

Mr. Marples, replying to both questions, considered that the law as it stood was adequate. The British Transport Commission had to obtain his approval before any line was opened for electric traction and the Chief Inspecting Officer of Railways approved, on his behalf, the type of fencing to be used.

Industrial workers' trains at Dagenham

Mr. John Parker (Dagenham—Lab.) asked the Minister of Transport if he was aware of the inconvenience caused to people travelling to and from the Ford Motor Company and other Thames-side industrial plants in Dagenham by the failure of the new electric trains from Southend to stop at Dagenham East Station; and if he would refer this matter to the appropriate Transport Users' Consultative Committee for their consideration.

Mr. John Hay, Parliamentary Secretary, Ministry of Transport, in a written answer, said this was primarily a matter for the British Transport Commission. The Transport Users' Consultative Committee for London was in fact considering representations which had been made on the subject.

Channel tunnel

Mr. William Teeling (Pavilion, Brighton—Con.) asked the Minister of Transport on April 26 whether the French Government had yet responded to the invitation from Her Majesty's Government for an inter-Governmental discussion on the channel tunnel, and whether he would make it clear to the French Government that the invitation still stood.

Mr. Marples said, in a written answer, the Government were in close touch with the French Government. He could say no more than that.

Annual cost to railways of extra oil duty

Mr. John Hall (Wycombe—Con.) asked the Minister of Transport on April 27 what additional cost would be incurred by British Railways during the 12 months 1961-62 as a result of the imposition of the 2d. a gallon duty on hydrocarbon oils.

Mr. Marples said, in a written answer, that he understood that the British Transport Commission estimated that the additional cost would be rather over £1 million.

Bradshaw's: no alternative

Mr. T. Driberg (Barking—Lab.) asked the Minister of Transport on April 24 if, in view of the fact that Bradshaw's railway guide was ceasing publication, he would issue a general direction to the British Transport Commission to publish a comprehensive national timetable of public transport services by rail and road.

Mr. Marples said in a written answer that he did not think that this would be a suitable subject for a direction.

Parliamentary Notes

Railways (Carriage of Mail) Bill

Mr. Daniel Jones (Burnley—Lab.) asked leave in the House of Commons on April 26 to bring in a Bill to require railway authorities to give greater protection to the carrying of Her Majesty's mail.

Leave was given to introduce the Bill. It was ordered to be printed, and set down for second reading on Friday, June 9.

(The sponsors of the Bill were Mr. Jones, Mr. Iorwerth Thomas (Rhondda W.—Lab.), and Mr. G. Elfred Davies (Rhondda E.—Lab.)

Future of the Great Central Line

Mr. George Darling (Hillsborough, Sheffield—Lab.—Co-op.) initiated an adjournment debate on April 24 concerning the curtailing of train services and the closing of stations on the Great Central Railway line between Marylebone and Sheffield and Manchester.

He said that he wanted to show that the area transport users' consultative committees and the Central Consultative Committee had been persuaded to agree to rather drastic reductions in train services by the use of very questionable figures supplied by British Railways officials, and far from being a white elephant, the line, with suitable and well-timed train services, could be made to pay. For geographical reasons it had been placed in the London Midland Region, which appeared to be the best place on the map. But the London Midland Region obviously did not want it. Therefore, it was administered by four different sections of British Railways, although it was only a relatively short railway service. The London Midland Region had, so to speak, overall control, but the south, or London, end of the line came under London Transport—the Harrow stretch—and then it passed to the London Midland Region, and came under the control of Crewe, then into the control of Derby, and then passed back beyond Rugby to the Eastern Region. North of Nottingham it came under the Great Northern traffic manager on the Eastern Region side.

None of these regions wanted the little bits and pieces of the line which each of them had to operate and control. So, between them, they were proposing to close down, if not all, most of the passenger services, and to restrict the freight services so far as possible, just to get rid of their administrative difficulties.

To be used for different type of traffic

Mr. John Hay, Joint Parliamentary Secretary to the Ministry of Transport, in reply, pointed out that what was proposed for the Great Central Line by the British Transport Commission was not its closure, but its use for a type of traffic different from the present type. The Minister had no responsibility for the closure of stations, withdrawal of services, and still less for adjustment of timing of trains.

If Mr. Darling would let him have chapter and verse of his allegations, he would ask Sir Brian Robertson to consider this matter.

CONTRACTS AND TENDERS

Carriage under-frames for the Sudan Railways

Sudan Railways has placed an order with the Metropolitan-Cammell Carriage & Wagon Co. Ltd., for 23 carriage under-frames complete with bogies, wheels and axles. This order is for delivery later this year and follows a previous order for 35 such frames at present in the final stages of production in the United Kingdom.

British Railways, Eastern Region, has placed the following contracts:

Grant, Lyon & Co. Ltd.: alterations to existing sidings, laying of additional sidings, and construction of lighting tower foundations at Parkeston Quay marshalling yard

George Simpson (London) Limited: construction of boiler house, fire bar and iron casting compound at Doncaster locomotive works

A. Bradbury & Son (Contractors) Ltd.: provision of new parcels office at Barnsley Exchange Station

Etchells, Congdon & Muir Limited: dismantling and removing of seven existing hydraulic lifts, and supply, and installation of six new 30-cwt. capacity electrically-operated goods lifts at Liverpool Street Station

W. & C. French Limited: repairs to outer dolphin of train ferry terminal, Harwich

Thomas Fletcher & Co. Ltd.: reconstruction of portion of superstructure of Underline Bridge No. 53, between Appleby and Elsham

W. & C. French Limited: reconstruction of piled sub-structure of Underline Bridge No. 63 over River Trent, between Newark (Castle) and Collingham

George Wimpey & Co. Ltd.: earthworks, etc., in connection with the provision of a new marshalling yard at Tinsley, Sheffield.

British Railways, Western Region, has placed the following contracts:

Jesse Tildesley Limited: supply of steelwork, etc., for the island platform roof at Port Talbot General Station

Baxter Bros. (1920) Ltd.: brush painting internal only, of "A" Shop, Locomotive Works, Swindon

Vacu-Blast Limited: supply and installation of shot blasting equipment at Shrewsbury Hookagate

Mountstuart Dry Docks Limited: work to be performed in connection with the annual overhaul for 1961, ss. *Great Western*

Automatic Telephone & Electric Co. Ltd.: provision and installation of an automatic telephone exchange at Reading General Station

John Smith (Keighley) Limited: supply and erection of two 10-ton overhead electric travelling cranes for Diesel Testhouse Locomotive Works, Swindon

Bolton & Paul Limited: supply and erection of a building to house facilities for vacuum brake cylinder repairs and testing, Carriage & Wagon Works, Swindon

A. C. Morrison (Engineers) Limited: supply, erection and commission of a standby supply generating set at Birmingham Snow Hill Station

Industrial Painting Contractors (Winchester) Limited: painting eight bridges on the Henley branch

Fairfield Shipbuilding & Engineering Co. Ltd.: supply of steel work for test rig, casting bed fittings, crane gantry girders and rails, etc., for the new concrete depot at Taunton

Smith Bros. Construction Ltd.: erection of a new staff hostel at Wharfdale Road, Tyseley

E. H. & L. Wells: construction of an automatic telephone exchange at Maidenhead Communications Systems Limited: provision and installation of telephone train control equipment at Paddington, Bristol and Cardiff

Vickery Bros. (Barry) Ltd.: alterations to be carried out to the station buildings at Barry Docks Station.

British Railways, Southern Region, has placed the following contracts:

G. E. Wallis & Sons Ltd.: improved staff accommodation at Victoria carriage servicing shed

D. Singleston & Son: alterations and improvements to Sherbourne Station

Macartney & Sons: repairs to roofing at Waterloo Station

Johnson Bros. (Aylesford) Ltd.: resurfacing and surface dressing of roads, footpaths and platforms in the Ashford District

W. & J. Glossop Limited: resurfacing and surface dressing of roads in the London (Western) District

John Mowlem & Co. Ltd.: new footbridge at Gladstone Road in connection with the extension of the electrification in the Southern Region

Rashleigh Phipps & Co. Ltd.; provision of lighting to platforms at Weymouth Harbour

F. G. Minter Limited: new telephone exchange at Waterloo Station

BOARD OF TRADE

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Pakistan:

50,000 "V" type anchors for 90 lb. FFBSR rails as per drawing No. CE/3129 and specification

100,000 "V" type anchors for 60 lb. FFBSR rails as per drawing No. CE/3129 and specification

120,000 "V" type anchors for 50 lb. FFBSR rails as per drawing No. CE/3129 and specification

30,000 "V" type anchors for 75 lb. FFBSR rails as per drawing No. CE/35803 and specification.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is PT/DI/27/60. The closing date is May 11, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13975/61.

200 sets fish plate compound MS for 75 lb. FBBSR and 90 lb. FBBSR as per drawing No. CE/29268/A and PRSS No. TIA-49.

The issuing authority is the Chief Controller of Stores, Pakistan Eastern Railway, Pahartali, Chittagong, to whom bids should be sent. The tender No. is PT/DI/4/57. The closing date is May 11, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13973/61.

320 steel trough plates 5 ft. 2½ in. long, 2 ft. wide and 3 7/16 in. deep, as per reference Mk. 510 Section 17 of Dorman Long.

The issuing authority is Pakistan Eastern Railway, Pahartali, Chittagong, to which bids should be sent. The tender No. is P7/A/1/61. The closing date is May 31, 1961. Local representation is considered desirable. The Board of Trade reference is ESB/13929/61.

From South Africa:

3 electric baggage lifts, 4,000 lb. load, car, size 9 ft. x 10 ft. 6 in. x 7 ft. high, in accordance with specification and drawings.

The issuing authority is the Stores Department, South African Railways. Bids should be sent to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. Local representation is essential. The tender No. is C.8647: Lifts. The closing date is May 26, 1961. The Board of Trade reference is ESB/13675/61.

From Sudan:

2 marking out tables each measuring 10 ft. x 3 ft. x 2 ft. 7 in. height. The tables should be accurately machined on top face and two edges to an accuracy of 1/1,000 in. per ft. The underside shall be provided with sufficient strengthening ribs and heavy standards and stays shall be provided.

The issuing authority is the Stores Department, Sudan Railways, Atbara, to which bids should be sent. The tender No. is 2371. The closing date is June 7, 1961. The Board of Trade reference is ESB/13958/61. No further information is available at the Board of Trade.

From the Philippines:

Supply of second-hand steel railway bridge superstructures.

The issuing authority is the Office of the Chief Engineer, Manila Railroad Company, Manila, to which bids should be sent. The closing date is May 10, 1961. The Board of Trade reference is ESB/13997/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

The Golden Jubilee of Locomotive Engineers. The Sir Seymour Biscoe Tritton Lecture to be delivered at the Institution of Locomotive Engineers by Sir Brian Robertson will be given on May 10 at the Institution of Civil Engineers, Great George Street, London, S.W.1, at 5.30 p.m., and not as formerly stated at the Institution of Mechanical Engineers on May 12.

Select Committee on Nationalised Industries. In our editorial last week entitled, "Comment on the Select Committee's findings," we stated that the report of the Select Committee on Nationalised Industries had not been published except through the medium of a White Paper based on its findings. This is incorrect. The report relating to British Railways was published on July 11, 1960, together with the proceedings of the committee. It was later published, although bearing the same date as the earlier publication, together with the proceedings of the committee, the minutes of evidence, and appendices.

Royal visit to Avon Rubber. H.R.H. The Duke of Edinburgh made a private visit to the Melksham factory of the Avon India Rubber Co. Ltd. on April 14. He was shown a display of products for the railway industry made by Spencer, Moulton & Co. Ltd., a subsidiary company. He showed particular interest in rubber rail pads, used with concrete railway sleepers, and also inspected a sectioned Garrington railway buffer with the shock-absorbing medium composed of rubber springs.

The Morgan Crucible group. The Morgan Crucible Co. Ltd. ceased to trade and became a holding company on April 3. Five new wholly-owned subsidiaries have assumed its production, trading, research, and development responsibilities, they are: Morganite Carbon Limited, Managing Director, Mr. C. S. Harris; Morganite Crucible Limited, Managing Director, Mr. D. S. S. Thynne; Morganite Electroheat Limited, Managing Director, Mr. I. Weston Smith; Morganite Research & Development Limited, Managing Director, Mr. J. Walker, and Morganite Exports Limited, Managing Director, Mr. J. H. Baumann.

Railway sleeper. A rail sleeper insensitive to temperature changes, and claimed to be lighter and cheaper than other sleepers has been invented in Hamburg. Made of plastic, the sleeper is considered by the inventor to be more durable than steel.

Anglo-Bulgarian trade negotiations. Negotiations were held, from April 6-21, with representatives of the Bulgarian Government, under the terms of the trade arrangement of February 27, 1959, for trade quotas for the next 12 months.

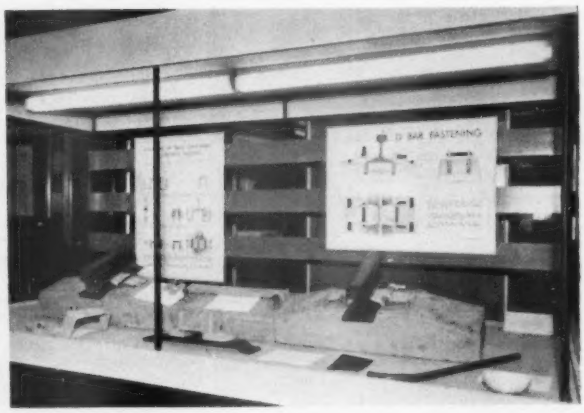
Glasgow Fair seat reservations. The Scottish Region of British Railways has announced that the special seat reservation system for Glasgow Fair Holidays which proved so successful in past years will be repeated. The arrangement will apply on Friday, July 14, and Saturday, July 15, at Glasgow's four main stations.

Edgware Station to close for parcels traffic. The London Midland Region of British Railways has announced that Edgware Station, terminus of the branch from Finchley Central, will be closed for parcels traffic on and from Monday, May 15. Parcels and passenger train merchandise will be dealt with at Hendon.

Modernisation Conference Exhibition. The photographs reproduced, below and left, were taken at the exhibition, arranged at the Institution of Civil Engineers, in connection with the Railway Modernisation Conference. The exhibits well exemplify the continuous progress made in the civil, electrical, and mechanical spheres. Prominent among the items displayed were models of developments at Leeds, and Cannon Street Station, and electric and diesel locomotives, the Pullman trains, and multiple-unit sets. Full-sized equipment included a concrete sleeper with a new method of rail fastening, automatic warning equipment, and electrical and signalling equipment. Also displayed was the equipment used on site to record movements, in three dimensions, of continuously welded rail.

Sir Lionel Kearns to visit Canada and U.S.A. Sir Lionel Kearns, Chairman of H. W.

Models of locomotives and rolling stock



Exhibits in the permanent-way section of the Modernisation Conference Exhibition

Kearns & Co. Ltd., will arrive in New York on May 23. While in the U.S.A., he will visit the exhibition of the American Society of Tool & Manufacturing Engineers where his company will be exhibiting a machine. He will depart from New York on May 27 to visit Canadian representatives of his company in Toronto and Montreal.

Hunslet (Holdings) Limited. Hunslet (Holdings) Limited announces that it has acquired for £21,500 cash the whole of the issued share capital in Materials Handling Equipment (Great Britain) Limited, supplier of side-operating fork-lift trucks.

Paint orders increased. A minimum of £100,000 additional business for member firms has been secured since the Scottish Association of Paint Manufacturers was formed a little more than a year ago.

Extension of Anglo-Japanese trade arrangement. The trade arrangements concluded in July, 1960, and covering the year ended March 31, 1961, between the United Kingdom and Japan, have been extended to September 30. Particulars of the arrangements were published in the Board of Trade Journal of July 22, 1960. Quotas on both sides for the extended period will generally be one half of those for the previous 12 months, but in a few cases there will be adjustments mainly to cater for seasonal trade.

Escorted tour of India. A 26-day escorted tour of India, based on the Queen's visit earlier this year, has been arranged by Thos. Cook & Son Ltd. On September 28 the tour will start from London and will cover visits to Srinagar in Kashmir, Delhi, Jaipur, Agra, Benares, Khatmandu in Nepal, Calcutta, Madras, Mysore and Bombay. Cost of the tour is 480 gns., which includes air travel out to Delhi, and return from Bombay; travel by air and private car inland; accommodation throughout at the best available hotels; all meals, including afternoon tea; the services of an escort; sightseeing and gratuities.

Midland Railway Co. of Western Australia Ltd. The report to June 30, 1960, of the Midland Railway Co. of Western Australia Ltd. shows gross receipts of £777,592 against £688,362 and working expenses at £575,094 which compare with £535,847, giving net receipts of £202,498 against £152,515. After adding interest, dividends, registration fees and deducting expenditure on and provision for renewals, depreciation of road service department assets, land taxes, etc., there is a balance for the year of £3,601 which compares with a debit balance of £93,217 for the previous year.

San Paulo (Brazilian) Railway Co. Ltd. The report of the San Paulo (Brazilian) Railway Co. Ltd., states that expenditure in Brazil exceeded receipts and resulted in a deficit of £4,146. Receipts in England amounted to £5,816 and expenditure to £7,071 a deficit of £1,255. The total deficit for the year was £5,401. After charging this amount to revenue account there remains £109,306 to be carried forward. During November, 1959, San Paulo Railway Investments Limited was incorporated as an investment trust, and the capital of the new company was £12,500, all of which was subscribed by the San Paulo (Railway) Co. Ltd. In addition, the latter company has advanced £132,000 in interest free loans.

Kango Electric Hammers. Preliminary profit figures of Kango Electric Hammers Limited for the year ended December 31, 1960, show consolidated trading profit before taxation at £124,279, leaving a balance after taxation of £63,999, and an available balance of £69,711.

Railway Benevolent Institution. At its April meeting the Board of the Railway Benevolent Institution granted annuities to eight widows and seven members involving an additional liability of £357 7s. a year. Some 202 gratuities were also granted amounting to £1,961 to meet cases of immediate necessity. Grants made from the Casualty Fund during March amounted to £1,171 13s.

Anti-Attrition Metal Co. Ltd. Anti-Attrition Metal Co. Ltd. and its subsidiaries show a profit on trading for the year ended December, 1960, of £12,542 plus a surplus on liquidation of staff superannuation fund of £8,197, giving a total of £20,739, which compares with a loss for 1959 of £95,686. The group profit after taxation, was £21,159, compared with a loss of £92,033, and the adverse balance brought forward from 1959 was £61,905, which compares with an adverse balance carried forward to 1961 of £40,746.

Open Forum at Wakefield. The North Eastern Region of British Railways held its eleventh open forum on April 25 in the Unity Hall, Wakefield, when, despite pouring rain, over 400 people attended. Chairman of the meeting was Mr. A. Dean, Assistant General Manager (Modernisation). The chief speaker was Mr. E. E. Cowell, Traffic Manager (West Riding), and the panel consisted of Mr. C. Ayers, District Goods Superintendent, Leeds; Mr. D. Hill, District Passenger Superintendent, Leeds; Mr. A. E. Purnell, District Operating Superintendent, Wakefield, and Mr. C. H. Swan, District Motive Power Superintendent, Wakefield. The chief guest at the meeting was Wakefield's Mayor Elect, Councillor W. Prince, himself a railwayman. The meeting was recorded by the B.B.C., and extracts from the question and answer session will be broadcast on Sunday afternoon, May 21, in the programme "On Railways."

Film shows in Scotland. Audiences at film shows to the staff of the Scottish Region of British Railways during March were more than double for the corresponding month in 1960. A total of 1,860 watched the films —shown in Edinburgh, Dundee, Glasgow, Inverness, Aberdeen and Inverurie—compared with 878 in March, 1960.

Pluvex used to repair landslide. No. 3 Pluvex Dampcourse, manufactured by the Ruberoid Co. Ltd., was used for blanketing purposes in the repair of the recent earth slip between Winchfield and Hook in Hampshire. The dampcourse consists of a lead-lined hessian-based bitumen-saturated sheeting and is completely waterproof and flexible. It does not crack through foundation settlement or vibration, and thus forms a permanent damp-proof barrier.

Modernisation of Notting Hill Gate Station. The illustration shows the Central Line platform at Notting Hill Gate Station after modernisation. It was proposed to tile the platform side of the tunnel and plaster the roof but it proved impracticable to hack off the existing tiles over the tracks in order to provide a key for the plaster ceiling and because of damp conditions many plaster bonding fluids could not be used. In spite of the vibration from continuous passage of trains, overhead pile driving, and the limited working time available it was eventually successfully carried out using "Synthaprufe" as the key. The work was carried out under the direction of Mr. T. R. Bilbow, former Architect, London Transport Executive. The linking of the Central and Circle Lines at Notting Hill Gate was described in our issue of March 6, 1959.

Platform at Notting Hill Gate Station after refurbishing

Railway Stock Market

There has been a fresh advance in stock markets with many industrial shares reaching new high levels, and little sign of a check to the buying wave, which received only a moderate set-back a week ago when there was a threat of civil war in France. Both big and small investors are buying, and markets are becoming short of shares, though on the other hand, many new issues are planned, and this should in time relieve the shortage. There is talk that before long more steel companies will raise capital by rights issues.

With demand concentrated on industrial shares, foreign rails have received very little attention and price changes were unimportant. Antofagasta ordinary stock was steady at 16 with the preference stock 34½. United of Havana second income stock eased from 6¼ to 6, and San Paulo Railway 3s. units were 1s. 0¾d. Mexican Central "A" bearer debentures changed hands around 59½.

Costa Rica ordinary stock changed hands up to 42 and was quoted at 40½ compared with 39½ a week ago. Guayaquil & Quito assented bonds were 54½ and Paraguay Central prior debentures 18½. Brazil Railway bonds were 4¼ and Chilean Northern first debentures 50.

Canadian Pacifics moved fairly closely with the trend of Wall Street markets, but at $43¾ were maintained on balance compared with a week ago: the 4 per cent debentures strengthened from 58¼ to 58¾, and the 4 per cent preference stock from 59½ to 60¼. White Pass shares eased from $10½ to $10. In French railway sterling bonds, Midi 4 per cents remained at 85½.

Nyasaland Railways shares were again 11s. with the 3½ per cent debentures 33½. Midland of Western Australia ordinary stock was 8½ and the £1 units of second debentures changed hands at 6s. 10½d. West of India Portuguese capital stock was 116¼xd. and Barsi Light Railway stock 17.

International of Central America common shares were $21½ and the preferred stock $112.

Among shares of locomotive builders and engineers, buyers were more in evidence, but price changes on balance were small. Following publication of the annual report, which emphasised the warnings previously given by the directors, Birmingham Wagon shares came back to 32s. 6d., compared with 36s. a week ago. Beyer Peacock 5s. shares have been firm at 7s. 10½d.xd., and Charles Roberts 5s. shares at 8s. 6d. were within 3d. of a week ago. Gloucester Wagon 10s. shares eased from 11s. to 10s. 6d. and Wagon Repairs 5s. shares were steady at 19s. 9d. G. D. Peters were 19s. 9d.xd. Westinghouse Brake came back from 42s. 3d. to 41s. 9d.

In electricals, A.E.I. have receded further to 45s. compared with 46s. 6d. a week ago, while English Electric eased from 37s. 6d. to 36s. 3d. and G.E.C. from 35s. 3d., to 36s.xd. Crompton Parkinson 5s. shares were 13s. 6d. and Mather & Platt 45s. Elsewhere, Tube Investments were 80s. 6d. and British Oxygen 5s. shares 36s. 9d. Pressed Steel 5s. shares came back from 31s. to 30s. but Dowty Group 10s. shares gained a few pence at 40s. T. W. Ward firmed up to 80s. 6d. helped by talk of higher dividend prospects, and G. & J. Weir 5s. shares, after reacting, rallied to 16s. 1½d. Pollard Bearing 4s. shares were firm at 44s. and Ransome & Marles 5s. shares 23s. Vickers at 36s. 3d.xd. held most of the rise which followed the maintained 10 per cent dividend. B.I.C.C. rose sharply to 61s. 10½d. while among machine tools, Clarkson (Engineers) 5s. shares advanced to 37s. 6d., a gain of 6s. compared with a week ago.

Forthcoming Meetings

May 6 (*Sat.*). The Branch Line Society, Bathgate & District railtour, departing from Maryhill Central at 1.50 p.m. to Avonbridge and Fauldhouse, returning to Glasgow Queen Street at 9.20 p.m.

May 6 (*Sat.*). The Railway & Canal Historical Society, at the Queen Hotel, City Road, Chester, at 6.30 p.m. Annual general meeting.

May 6-7 (*Sat.-Sun.*). The Railway & Canal Historical Society, canal trip from Anderton Lift to Runcorn, and coach tour of Wirral Railways.

May 8 (*Mon.*). The Historical Model Railway Society, London Section, at Keen House, Calshot Street, London, N.W.1, at 7 p.m. "Pre-group signals," Mr. E. I. Vaughan.

May 10 (*Wed.*). The Railway Students' Association. Visit to Paddington Station.

May 10 (*Wed.*). The Institution of Electrical Engineers, Supply Section, at Savoy Place, London, W.C.2, at 5.30 p.m. "Electricity supply in India and its future," Mr. M. Datta.

May 10 (Wed.). The Institution of Locomotive Engineers, at the Institution of Civil Engineers, Great George Street, S.W.1, at 5.30 p.m. "The Sir Seymour Biscoe Tritton Lecture," Sir Brian Robertson.

May 10 (*Wed.*). The Institution of Locomotive Engineers, at the Dorchester Hotel, Park Lane, London, W.1, at 12 noon. The Golden Jubilee Luncheon. Admission by ticket only.

May 11 (*Thu.*). The Institution of Locomotive Engineers. All-day visit to the West Country. Depart Paddington 9 a.m.

May 12 (*Fri.*). The Institution of Locomotive Engineers at Marylebone Goods Station. Exhibition of Locomotives and Rolling Stock. For the information of members only.

May 12 (*Fri.*). The Institution of Locomotive Engineers, at the Dorchester Hotel, Park Lane, London, W.1, at 7.15 p.m. Informal dinner. Admission by ticket only.

May 12-13 (*Fri.-Sat.*). The Institution of Electrical Engineers, Utilisation Group. Visit to Llandudno.

May 25 (*Thu.*). The Institution of Electrical Engineers, Utilisation Section, at Savoy Place, London, W.C.2, at 5.30. Annual lecture on "Electric traction," Mr. J. A. Broughall.

OFFICIAL NOTICES

TRANSPORT OFFICER

THE WEST MIDLANDS Divisional Coal Board require a man experienced in rail and commercial vehicle operations for the post of Divisional Transport Officer. Salary will be within the range £1,600-£2,100. The successful candidate will be responsible for general liaison with British Railways in connection with railway operating and commercial problems inherent in servicing 40 collieries. He will also be responsible for the management of a fleet of over 500 commercial vehicles and vans employed on various types of haulage, and generally controlling, advising and preparing reports on road, rail and canal transport matters. Applicants must have had a wide experience in the operational control and maintenance of vehicles employed on different types of haulage and be familiar with the costing and revenue aspect of a large fleet of commercial vehicles. A sound knowledge of the wages structure for, and conditions of employment of, road transport operatives and of the responsibilities of operators under the Road Transport Acts of 1930 and 1934 and the Road and Rail Act of 1933 are essential. Associate membership of the Institute of Transport would be an advantage.

Application forms from:—D.C.S.O. (RG), Himley Hall, Dudley, Worcs., to be returned by May 19, 1961.

GHANA CIVIL SERVICE

APPLICATIONS are invited for the post of ASSISTANT SUPERINTENDENT MARINE ENGINEER in the GHANA RAILWAYS AND HARBOURS ADMINISTRATION.

Duties: Required to assist the Superintendent Marine Engineer in the maintenance of harbour tugs and launches, in carrying out hull and engine survey, and in the administration and functions of the workshops, slipway, dry dock and mechanical section of the Marine Engineer when required.

Qualifications: First class Marine Engineer's Certificate recognised by Lloyds preferably steam with diesel endorsement. Practical experience in a ship or repair yard an advantage. A thorough knowledge of steam, petrol and diesel engines and ship repairs essential. If otherwise, suitable steam qualifications only would be acceptable. Salary range £1,380-£1,730 p.a.

Appointment on contract/gratuity terms for two tours each of not less than 15 months and not more than 18 months, plus earned leave. Gratuity at rate of £150 p.a. Free passages for officer, wife and up to three children below the age of 18 years and in addition an education allowance for children when not resident in Ghana of £100 p.a. a child for up to three children under 18 years. Accommodation at low rental. Interest free advance for car and car maintenance may be granted. Generous leave on full pay. Income tax at low local rates. Preservation of superannuation pension rights, where applicable, may be arranged.

For further particulars and application forms write to THE DIRECTOR OF RECRUITMENT, GHANA HIGH COMMISSION, 248 TOTTENHAM COURT ROAD, LONDON, W.1.

THE GHANA SUPPLY COMMISSION

THE GHANA SUPPLY COMMISSION acting for and on behalf of the Government of Ghana as their duly authorised agents, invite tenders from qualified manufacturers for the manufacture and supply of:

Ref.: GSC/RLY. 2027.

DESCRIPTION:—

1. Steel Rails 80 lbs. R.B.S. Flat bottomed, 40 ft. long (approx. 2,515 tons).
2. Steel Fish Plates, shallow 16 in. long, for four Fish bolts to fit item 1 (approx. 6,000 Nos.).
3. Steel Fish Bolts and Nuts, ⅞ in. dia. x 4 5/16 in. long (square, round Hex) nut screwed 2¼ in.

The relevant Specifications and Tender Forms with the General Conditions of Contract are obtainable on application from the Secretary, Ghana Supply Commission, Post Office Box M. 35, Accra, on the payment of £G1 as a deposit, not later than May 31, 1961.

GHANA SUPPLY COMMISSION

THE GHANA SUPPLY COMMISSION acting for and on behalf of the Ghana Government, invite applications from Structural Engineering firms to tender for:—

Ref.: GSC/RLY. 2022.

DESCRIPTION:—

(*a*) Design.
(*b*) Supply and Fabrication.
(*c*) Erection of the structural steel work for the proposed Extension to the Carriage and Wagon Shop.

Applications must be accompanied by £G1, and should reach the Secretary, Ghana Supply Commission, P.O. Box M. 35, Accra, not later than May 31, 1961.

The relevant Specification, Drawings and General Conditions of Contract will be forwarded to each firm for tender.

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Require two years' varied railroad engineering service, or five years in direct charge of track crews. Will supervise 135 men maintaining 45-mile railroad, assign work, order materials, be responsible for safety, make regular detailed inspections of roadbed and all track on main line, sidings and yards, bridges, tunnels, etc. Will make engineering calculations relating to maintenance and use of structure and equipment. Must speak Spanish. Married or single candidates acceptable.

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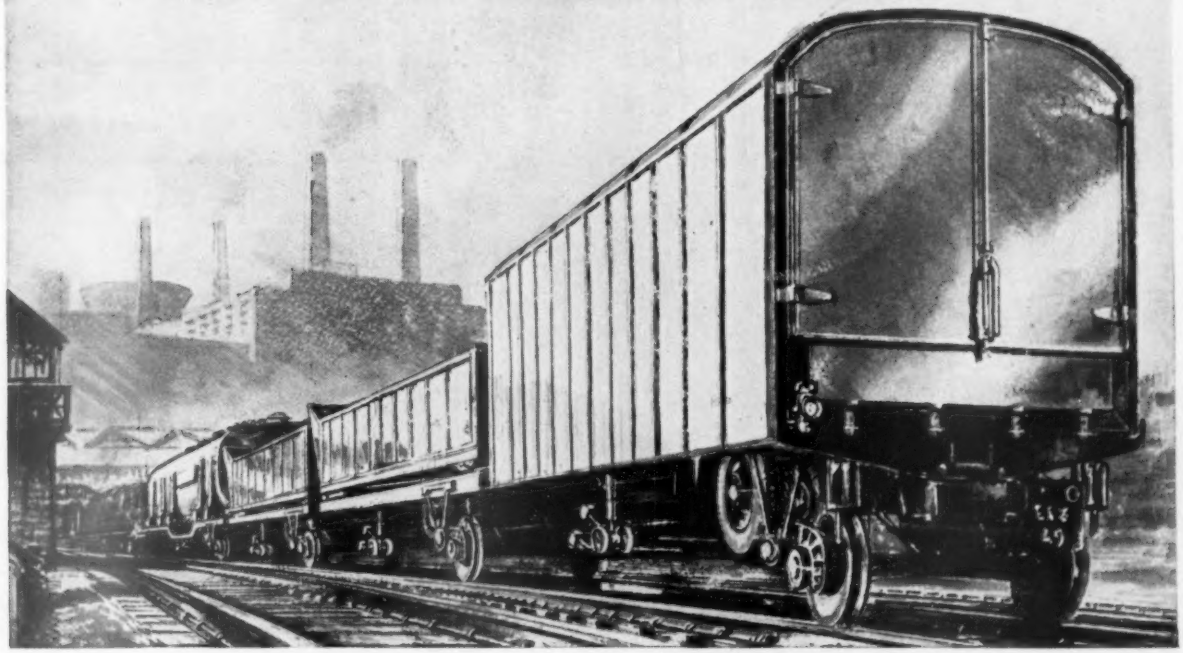

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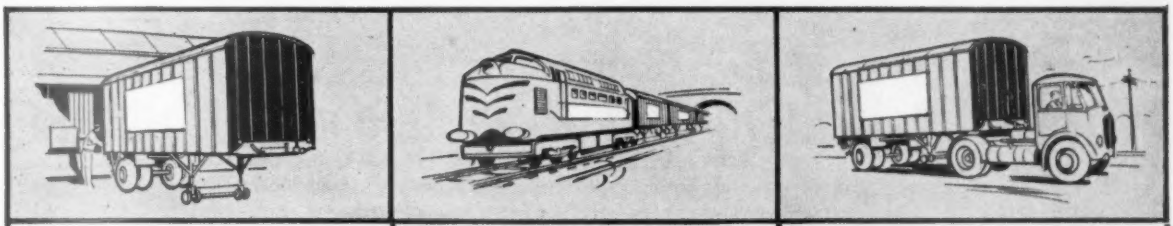

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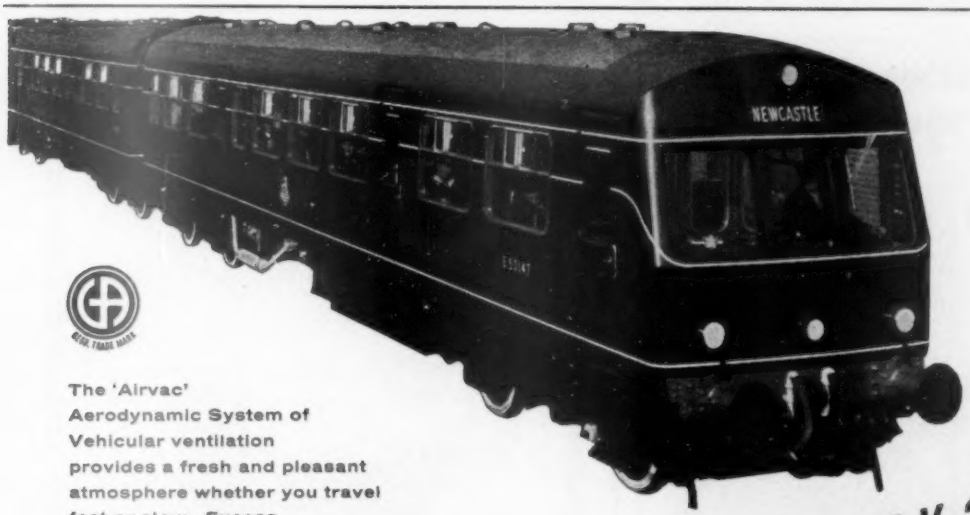

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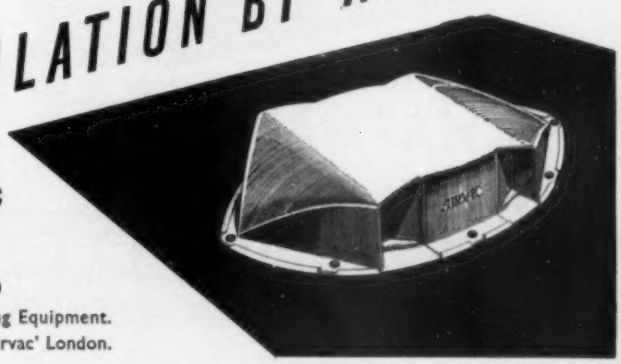

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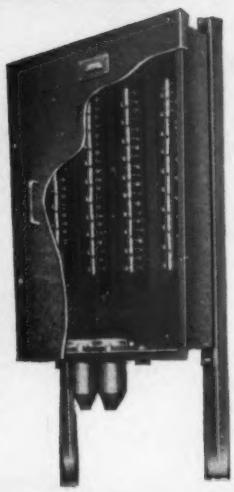

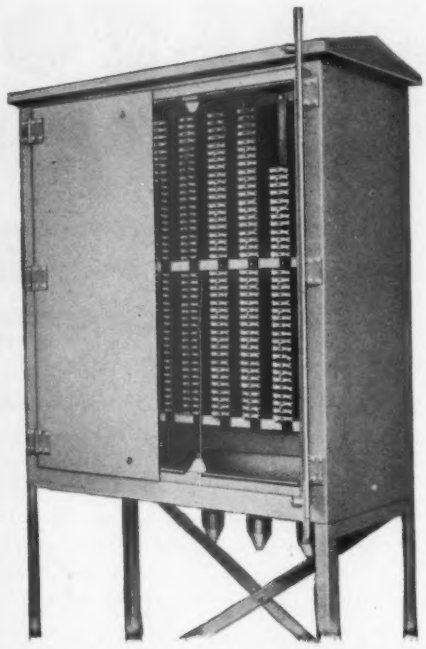

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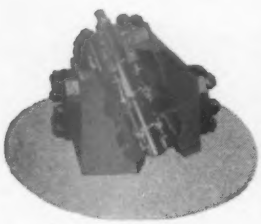

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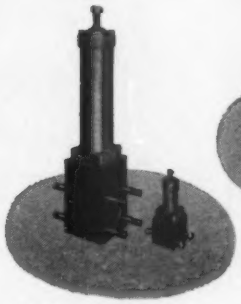

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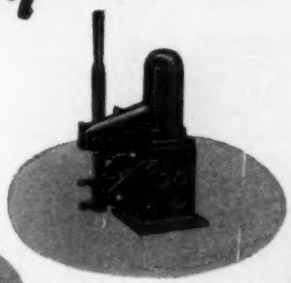

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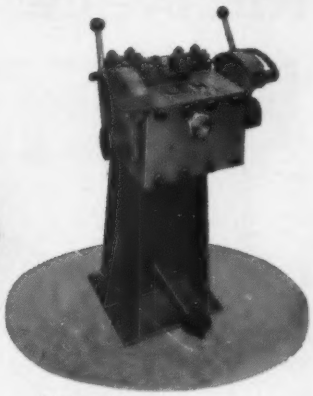

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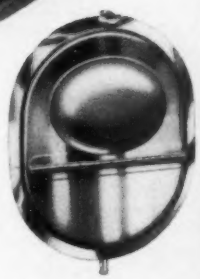

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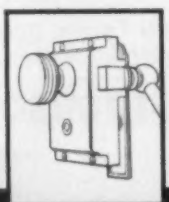

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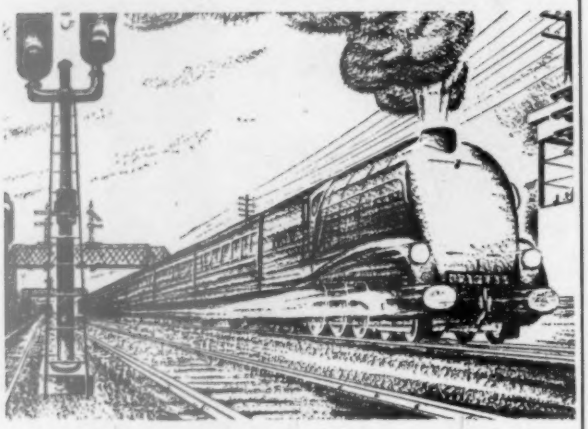

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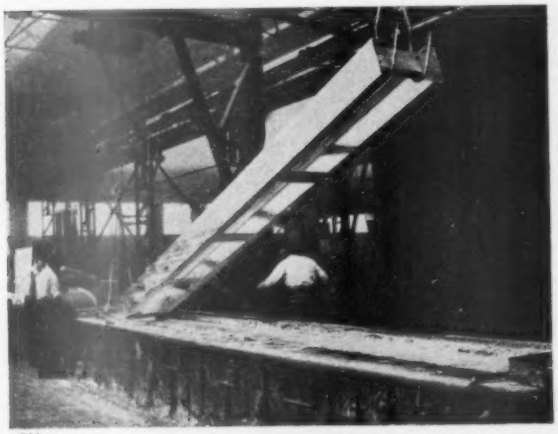
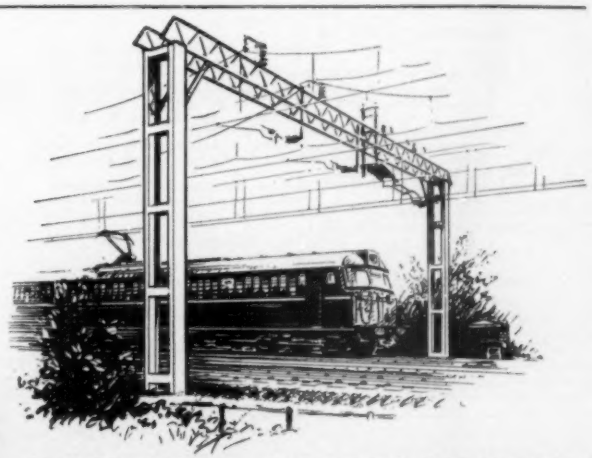


G/4



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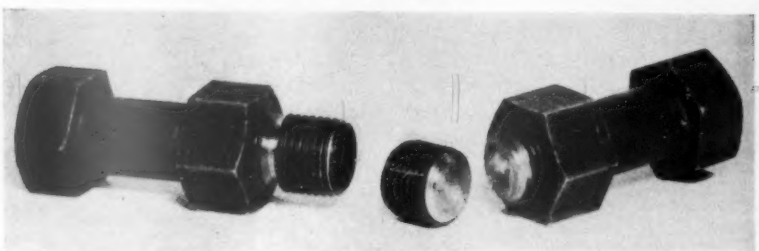

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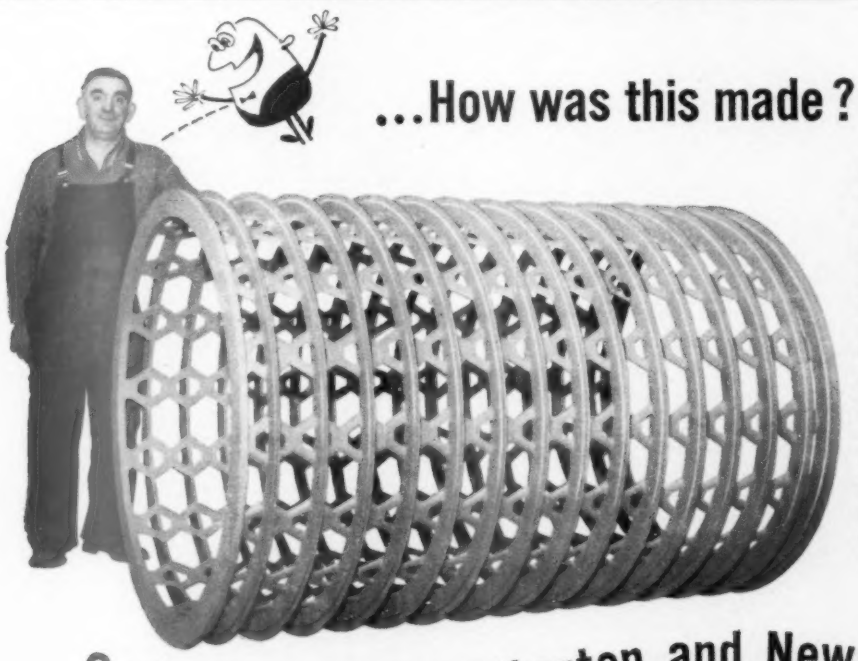

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Abtus, Ltd. 46
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Alfloc Water Treatments Service ... ... —
Alldays & Onions, Ltd. ... —
Allen, Edgar, & Co., Ltd. 44
Allgemeine Elektricitats Gesellschaft ... ... —
Andre Rubber Co., Ltd. ... —
Armstrong Patents Co., Ltd. —
Asquith, Wm., Ltd. ... —
Associated British Machine Tool Makers, Ltd. ... —
Associated Electrical Industries-GRS, Ltd. ... 58
Associated Electrical Industries (Manchester), Ltd. 7
Associated Electrical Industries (Rugby), Ltd. ... —
Associated Electrical Industries (Woolwich), Ltd. ... —
Associated Lead Manufacturers, Ltd. ... ... —
Atlas-Copco A/B ... ... —
Auster, Ltd. ... ... —
Austin Taylor Electrical Ltd. 50
Automotive Products Co., Ltd. ... ... —

Bagnall, W. G., Ltd. ... —
Baker, John, & Bessemer, Ltd. ... ... —
Bayliss, Jones & Bayliss, Ltd. —
Beckett, Laycock & Watkinson, Ltd. ... ... —
Belships Co., Ltd., Skibs A/S 8
Benjamin Electric Co., Ltd. —
B.E.N. Patents, Ltd. ... —
Beresford, James & Son Ltd. 51
Berry, Henry, & Co., Ltd. —
Beyer, Peacock, Ltd. —
Beyer, Peacock Gorton, Ltd. ... ... —
Beyer, Peacock (Hymek), Ltd. ... ... —
Beyer, Peacock, Railway Equipment, Ltd. ... —
Bintex, Ltd. 10
Birfield Industries, Ltd. ... —
Birkett, T. M., Billington & Newton, Ltd. 55
Birmingham Railway Carriage & Wagon Co., Ltd. —
Bolton Gate Co., Ltd. ... —
Bolton, Thos., & Sons, Ltd. 49
Booth, James, Aluminium Ltd. ... ... —
Bowmaker (Plant), Ltd. ... —
Boydell, E., & Co., Ltd. ... 16
Bristol Siddeley Engines, Ltd. —
Britannia Batteries, Ltd. ... —
British Electrical Repairs, Ltd. ... ... —
British Ermeto Corp., Ltd. —
British Furniture Exhibition —
British Insulated Callender's Cables, Ltd. ... ... —
British Insulated Callender's Construction Co., Ltd. ... 27
British Oxygen Co., Ltd. ... —
British Oxygen Gases, Ltd. —
British Paints, Ltd. ... ... —
British Railways 47
British Timken, Division of The Timken Roller Bearing Company ... 1
British United Traction, Ltd. —
Bromsregulator Svenska Akt. 28
Brown Bayley Steels, Ltd. ... —
Brown, David (Industries), Ltd. ... ... —
Brush Traction, Ltd. ... —
B.T.R. Industries, Ltd. ... —
Bull, John, Rubber Co., Ltd. —
Bullers, Ltd. ... ... —
Butler Machine Tool Co., Ltd. ... ... —

Caterpillar Tractor Co., Ltd. ... ... —
C.A.V., Ltd. ... ... —
Chapman, A. W., Ltd. 50
Chipman Chemical Co., Ltd. —
Churchill Machine Tool Co., Ltd. ... ... —
Clayton-Wright, Howard, Ltd. ... ... —
Cleveland Bridge & Engineering Co., Ltd. ... ... —
Cleveland Meters, Ltd. ... —
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Cockerill, S. A., Ougree ... —
Colvilles, Ltd. ... ... —
Commonwealth Sales Corporation ... ... —
Consolidated Pneumatic Tool Co., Ltd. ... ... —
Conveyancer Fork Trucks, Ltd. ... ... —
Cooper, Geo., & Sons ... 54
Coventry Machine Tool Works, Ltd. ... ... —
Cowans, Sheldon & Co., Ltd. 52
Craven Bros. (Manchester), Ltd. 24
Cravens Limited 11
Crompton Parkinson, Ltd. —

Davey, Paxman & Co., Ltd. —
Davies & Metcalfe, Ltd. ... 40
Dean, Smith & Grace, Ltd. 25
Docker Brothers 21
Dorman Long (Africa), Ltd. —
Dragonair, Ltd. ... ... —
Drewry Car Co., Ltd. ... —
Drummond Asquith, Ltd. 22
Du Pont (United Kingdom) Ltd. ... ... —

Eagre Construction Co., Ltd. —
Elastic Rail Spike Co., Ltd. —
Enfield - Standard Power Cables ... ... —
English Electric Co., Ltd. —
English Steel Corporation, Ltd. ... ... —
E.N.V. Engineering Co., Ltd. —
Ericssons Signalaktiebolag, L.M. 13
Eutectic Welding Alloys Co., Ltd. ... ... —
Expanded Rubber Co., Ltd. —
Eyre Smelting Co., Ltd. ... 53

Fairclough, Leonard, Ltd. —
Falk, Stadelmann, & Co., Ltd. ... ... —
Fawcett Preston & Co. Ltd. —
Ferguson Battery Co., Ltd. 52
Ferodo, Ltd. ... ... —
Fibreglass, Ltd. ... ... —
Finlay Engineering, Ltd. ... —
Flextol Engineering Co., Ltd. ... ... —
Fowler, John, & Co. (Leeds), Ltd. 26
French Railways ... ... —

Ganz-Mávag ... ... —
General Electric Co., International ... ... —
General Electric Co., Ltd. 34, 35
General Motors Overseas Operations ... ... —
General Steel Castings Corporation ... ... —
Glacier Metal Co., Ltd. ... —
Gloucester Railway Carriage & Wagon Co., Ltd. —
Godwin Warren (Engineering), Ltd. ... ... —
Greenwood's & Airvac Ventilating Co., Ltd. ... 49
Gresham & Craven, Ltd. ... 32
Griffiths Bros. & Co. (London) Ltd. ... ... —
Grover & Co., Ltd. ... —

Hackbridge & Hewittic Electric Co., Ltd. ... 30
Hackbridge Cable Co., Ltd. —
Hadfields, Ltd. ... ... —
Hallam, Sleigh & Cheston, Ltd. ... ... —
Hardy Spicer, Ltd. ... ... —
Harper, John, & Co., Ltd. ... —
Harvey, G. A., & Co. (London), Ltd. 53
Hasler Telegraph Works, Ltd. 37
Henderson & Keay, Ltd. ... 6
Henschel Werke, G.m.b.H. —
Hitachi Ltd. 29
Hoffmann Manufacturing Co., Ltd. ... ... —
Holman Bros. & Co., Ltd. —
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Hudswell Clarke & Co., Ltd. —
Hunslet Engine Co. Ltd. ... —
Hurtley, Fred., & Son Ltd. —
Hyde, Robert, & Son Ltd. ... —

Illingworth, E., & Co., Ltd. 48
Imperial Aluminium Co., Ltd. ... ... —
Imperial Chemical Industries, Ltd. 23
Interchangeable Tool Co. ... —
Intermit, Ltd. ... ... —
International Twist Drill Co., Ltd. ... ... —
Isca Foundry, Ltd. ... ... —
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Kendall & Gent, Ltd. ... —
Kenitra Co., Ltd. ... ... —
King, George, W., Ltd. ... 15
Kisha Seizo Kaisha, Ltd. ... —
Kitchen & Wade, Ltd. ... 22
Klockner-Humboldt-Deutz, A.G. ... ... —
Krauss, Maffei A.G. ... 20
Kretz, P. Ing., Dipl. ... —
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Lamigraph Ltd. ... ... —
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Laycock Engineering, Ltd. —
Le Carbone (Great Britain), Ltd. ... ... —
Leeds Engineering & Hydraulic Co., Ltd. 51
Levick, John, Ltd. ... —
Lifting Gear Products (Engineering), Ltd. ... ... —
Lockheed Precision Products, Ltd. ... ... —
Lockspike, Ltd. ... ... —
Londex Ltd. ... ... —
London Transport Executive —
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Macdonald, John, & Co. (Pneumatic Tools), Ltd. ... —
Marcroft Wagons, Ltd. ... —
Marsden, Samuel, & Son, Ltd. ... ... —
Marston Excelsior, Ltd. ... 23
Maschinenfabrik Augsburg-Nurnberg, A.G. ... —
Massey, B. & S., Ltd. ... —
Matisa Equipment, Ltd. ... —
Maus, J.M.J., Ltd. ... ... —
Metalastik, Ltd. ... ... —
Metallic Seamless Tube Co., Ltd. ... ... —
Metropolitan-Cammell Carriage & Wagon Co., Ltd. 9
Mills, The Exors. of James, Ltd. ... ... —
Miner, W. H., Inc. ... —
Mirrlees, Bickerton & Day, Ltd. ... ... —
Mitchell, Shackleton & Co., Ltd. ... ... —
Mobil Oil Co., Ltd. ... —
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Murex Welding Processes, Ltd. ... ... —

National Provincial Bank ... —
Neal, R. H., & Co., Ltd. ... 31
Newton Bros. (Derby), Ltd. —
Nife Batteries, Ltd. 3
Nippon Signal Co., Ltd. ... —
North Bar Tool Co., Ltd. ... 55
North British Locomotive Co., Ltd. ... ... —
Northern Aluminium Co., Ltd. ... ... —
Nuts & Bolts (Darlaston), Ltd. ... ... —

Oleo Pneumatics, Ltd. ... —
Ormerod Shapers, Ltd. ... —
Osborn, Samuel, & Co., Ltd. 2
Ottermill Switchgear, Ltd. ... —

P. & M. Co. (England), Ltd. 14
Palnut Co., Ltd., The ... —
Parkinson Cowan Industrial Products, Ltd. ... ... —
Parkinson, J., & Son (Shipley), Ltd. ... ... —
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Plasser & Theurer ... ... —
Plasser Railway Machinery (G.B.), Ltd. ... ... —
Powell Duffryn Engineering Co., Ltd. 19
Preformed Line Products (Gt. Britain), Ltd. ... —
Pressed Steel Co., Ltd. ... 45
Provident Mutual Life Assurance Association 54

Railko, Ltd. ... ... —
Railway Signal Co., Ltd. ... —
Ransomes & Rapier, Ltd. ... —
Rawlings Manufacturing Co., Ltd. ... ... —
Regent Oil Co., Ltd. ... —
Reyrolle, A., & Co., Ltd. ... 43
Rheinstahl Siegener Eisenbahnbedarf, A.G. ... —
Richards, Chas., & Sons, Ltd. ... ... —
Roberts, Charles, & Co., Ltd. ... ... —
Roberts, J. W., Ltd. ... 38
Rolls-Royce, Ltd. ... —
Rozalex, Ltd. ... ... —
Ruston & Hornsby, Ltd. ... —

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Setright Registers, Ltd. ... —
S.G.E. Signals Ltd. ... 42
Sheffield Twist Drill & Steel Co., Ltd. 12
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Siemens & Halske, Akt. ... —
Silentbloc, Ltd. 17
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Simmonds & Stokes (Niphan), Ltd. 54
Skefko Ball Bearing Co., Ltd. ... ... —
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South Wales Switchgear Co., Ltd. ... ... —
S.P.E. Co., Ltd. ... ... —
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Steel Coy. of Wales, Ltd. ... 33
Steel, Peech & Tozer ... —
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Summerson, Thos., & Sons, Ltd. ... ... —
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Vulcanised Fibre, Ltd. ... —

Walker, James, & Co., Ltd. 18
Ward, H. W., & Co., Ltd. ... —
Ward, Thos. W., Ltd. ... 54
Werkspoor, N.V. 41
Westinghouse Brake & Signal Co., Ltd. 4
White, R., & Sons (Engineers), Ltd. ... ... —
Wickham, D., & Co., Ltd. ... 57
Wild, A. G., & Co., Ltd. ... 36
Williams, Henry, Ltd. ... —
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Zwicky, Ltd. ... ... —

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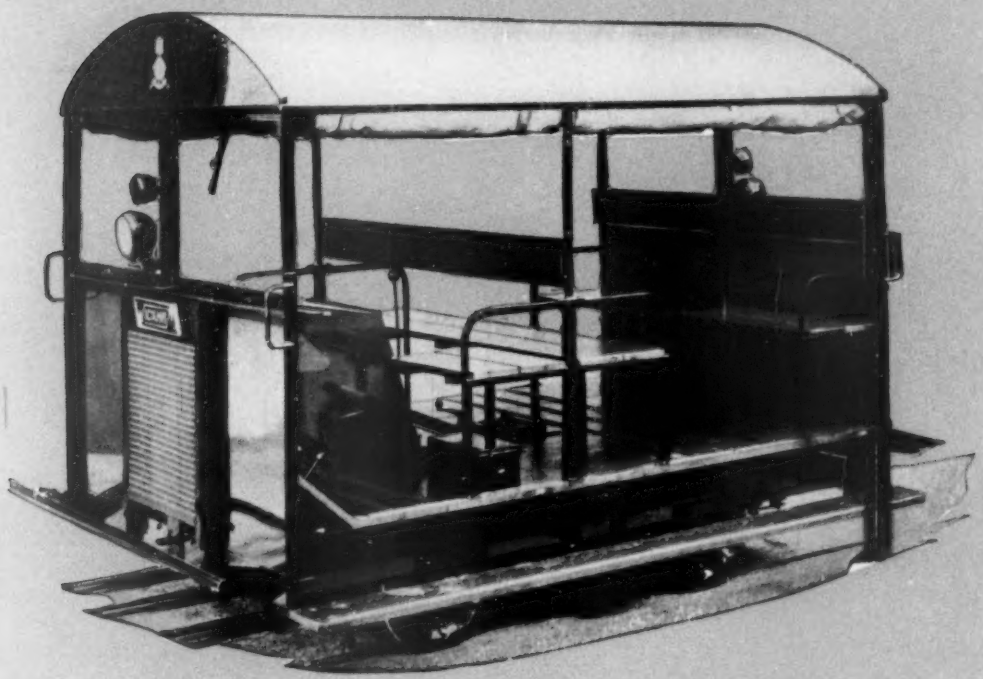

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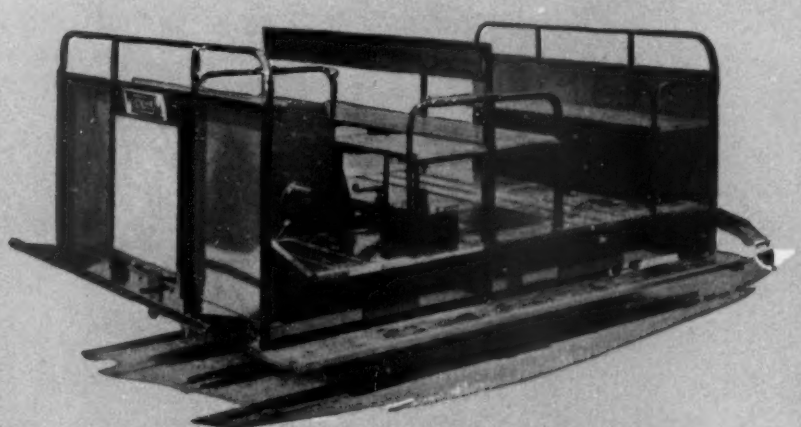

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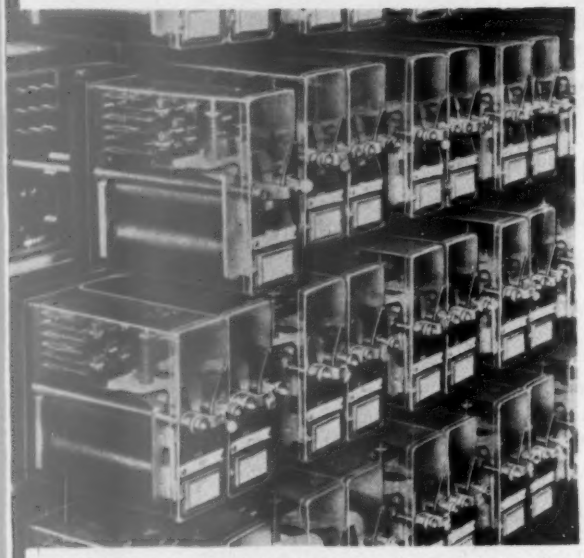

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